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ABSTRACT

This report documents the creation and evaluation of materials for the Carroll County, Maryland, elementary school science curriculum. Based on a 1983 pilot study and implementation of this program, funding was secured from the National Science Foundation for evaluation of the program. The principal investigating agency was the Carroll County Board of Education, working in conjunction with the Maryland State Department of Education, Hood College and the University of Maryland. The program provided preservice training for all teachers, follow-up workshops, program evaluation and identification, training and support of science coordinators in each school. The evaluation found the locally develped program to be significantly (p less than .001) better than two textbook approaches to which it was compared in amount of hands-on activity, inclusion of scientific processes, student motivation and teacher motivation. It was significantly more difficult (p less than .001) to implement then the textbook approaches. The bulk of the document consists of appendices which include statements of principles, pilot designs, duties of coach, operational definitions of processes, congruence with state framework, kit contents, supplemental text lists, live material center description, summer program information, and evaluations of Parent-Teacher presentations, the pilot study, and workshops. (JM)

THE CARROLL COUNTY ELEMENTARY SCIENCE PROGRAM: A HANDS ON APPROACH

BY
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ABSTRACT

The Carroll County elementary science program is a newly implemented curriculum that emphasizes a hands-on approach to science. It is based upon locally developed materials that were designed at each grade level around science process skills instead of concepts. Successive grade levels employ a greater number and a higher order of these processes. Since this is not a text program, all lessons are based upon hands-on activities contained in the teacher's guide. Subsequent lessons are intended to extend these experiences into other areas such as art, language arts, or math where other applications can be made.

This program was implemented after a pilot study showed that it resulted in greater motivation for both teachers and students than either of the other two programs under consideration. Also, part of that decision was based upon the determination that this science curriculum emphasized the processes of science to greater extent than the other programs considered. It also required more hands-on activities of both teachers and students.

Although relatively new, this elementary science program is characterized by a a high level of teacher support and teacher involvement. A Task Force of teachers was involved in the selection of the program as well as the planning and development of lessons it contained. Teachers are supported by a comprehensive set of curriculum materials in addition to an extensive training effort that has been directed toward familiarizing them with the contents of the program. More importantly, that effort has focused upon the retraining of teachers in teaching hands on science that emphasizes processes instead of concepts.

PROJECT BACKGROUND

During the 1984-85 school year, the Carroll County Public Schools began a two phase process of implementing a new elementary science curriculum. This has been the result of an intensive three and one half year study effort on the part of a large number of teachers and administrators. Using predetermined criteria, three science programs were identified for inclusion in a pilot study conducted during the second semester of the 1982-83 and the first semester of the 1983-84 school years. This pilot study was statistically based and employed a research design in which all 40 participating teachers were randomly assigned to teach two of the programs for one semester each.

A Task Force of teachers and administrators had been in existence since the beginning of this revision effort. Its members were charged with both steering the process and. ultimately, making the final recommendation on the program to be implemented. Five decision criteria had been determined in advance. The analysis of data indicated that four of the five criteria favored the selection of a non-textbook, laboratory-based program over the two text-based programs under consideration. The Task Force eventually recommended that the non-text program be adopted and implemented system-wide. This was begun in half of the schools during the 1984-85 school year while remaining schools have begun the implementation of the new program during the current school year.

The initial planning for this curriculum project began in the summer of 1981. At that time the Concepts in Science program had been in place in the Carroll County Public Schools for the previous thirteen years. A decision was made to evaluate and revise that program. All elementary teachers were surveyed and asked to 1) evaluate the curriculum in place and; 2) identify the problems found in its use. Sixty-nine percent of the responding teachers indicated that the elementary science program needed to either be revised or replaced.

Based on these results, an Elementary Science Task Force consisting of classroom teachers, principals, and supervisors was created in January 1982 to address the problem. The Task Force developed a "Statement of Principle" that philosophically described the desired characteristics of an elementary science program as envisioned by that Task Force. Although the full text of that statement is included in Appendix A, some of the key points were that elementary science should:

- be a hands-on approach with direct involvement of students.
- have concepts appropriate for the developmental level of students.
- make extensive utilization of the processes of science.

Text programs were evaluated using the "Checklist for Evaluating Science Textbooks" developed at the University of Georgia. This ultimately resulted in the identification of three commercial programs. The primary author of each of these three commercial text series met with the Task Force to present and discuss their individual programs. Subsequently, a determination was made to pilot two of these along with a locally developed laboratory-based approach to elementary science. The decision to develop local materials was made since none of the commercial programs fully met all the criteria in the Statement of Principle.

In January 1983 a year long pilot of those three programs was begun. Piloting was undertaken by forty elementary classroom teachers who were drawn from a pool of volunteers. The pilot teachers were randomly assigned to one of three treatment groups. Each teacher taught one of the pilot programs in the spring semester and a second program during the fall semester of the 1983-84 school year. To avoid potential bias, the number of teachers using each program as their first assignment was the same as the number who would teach it as their second assignment (Appendix B). During this time pilot teachers recorded data that became part of the evaluation of the three programs being considered.

Based upon these data the Task Force selected the locally developed, laboratory-based program for implementation system-wide. Half of the elementary schools in the county began use of the program in the 1984-85 school year while the remaining half began in September, 1985. Implementation has been coupled with an extensive training program. Teachers were paid to attend summer workshops at each grade level. The first day of each of these training sessions involved instruction on how to teach specific lessons by teachers who were involved in the development, piloting and revision of the materials. The concept of teachers teaching teachers was one intended to lay the foundation for the greater acceptance of the new program. The second day of training was provided by a consultant who continued familiarizing teachers with specific lessons they would teach. These lessons were used as a vehicle to actually instruct teachers in the approaches and management considerations to be used in teaching hands on science.

After nine weeks all teachers of the program were brought together by grade level for a one day follow-up workshop so that problems they were encountering could be discussed and resolved. At that time teachers were provided with more

background in the science content of the lessons taught at their grade level. The intent was to provide teachers with a greater depth of understanding of the theories and principles involved so as to increase their own self-confidence in what they were teaching. In that first follow up workshop, teachers also worked with developing testing strategies appropriate for use in teaching hands-on science and participated in a problem solving session in which they discussed difficulties and shared successes. A second follow up workshop was held in February to further work out implementation problems.

As a part of the implementation of the program, a graduate student from the University of Maryland was used as a coach for teachers. As such, they have worked with teachers in the planning and development of lessons. Although they have not permitted to teach the lessons for teachers, these individuals were able to provide teachers with informal feedback as to how they were able to implement the strategies presented in the training sessions in their lessons. Since this was outside the evaluation/observation process, teachers viewed this coaching component to be invaluable in the implementation of this new program. A list of her duties is included in Appendix C.

Based upon the experience of the pilot study and the implementation of this program in the first phase of school, a funding proposal was submitted to this National Science Foundation. Although the principal investigating agency for this proposal was the Carroll County Board of Education, it was developed in conjunction with the Maryland State Department of Education, Hood College and the University of Maryland with subcontracts included from the latter two. On 7 June, 1985 notification was received that this proposal would be funded by NSF for $122,713 which provided for the following:

1) Preservice training for 155 teachers who were for the first time be implementing the new program in the 1985-86 school year. All grade level teachers were included in this training regardless of whether or not were teaching science next year.

2) Follow up workshops during the school year that were to help 105 implementing teachers work through problems like those which arise in teaching any new program.

3) Three graduate assistants from the University of Maryland who served as coaches to assist implementing teachers. Two were employed with teachers using this program for the first time; the third worked with those individuals teaching the program for the second year.

4) Two Honors Workshops for which 45 excellent teachers were to be identified and received advanced graduate level training. The first of these occured in July 1985 with the second scheduled for summer, 1986.

5) Continued evaluation of the program and an assessment of the extent to which the program has been properly utilized by teachers.

6) The identification, training and support of science coordinators in each school. These individuals serve as resource people for other teachers and assist principals in supplying the material needs required to ensure the continuation of the elementary science program.

PROGRAM DESCRIPTION

This program can be best characterized as a hands-on elementary science curriculum for grades one through five. It is intended to emphasize the development of the processes of science as a means of problem solving rather than simply focusing only upon content and concepts. The science processes taught include observation, classification, measuring, recording, inferring, and predicting. Appendix D provides an operational definition of these processes as used in this program.

As students progress from level to level of the program, higher order processes are introduced. The content consists of three basic units at each grade level. These units are essential lesson cluster dealing with a topic of study (e.g. magnetism) and built around the science process skills identified for instruction at that grade level. Within the total program a wide variety of topics in both the biological and physical sciences are included. Specific units at individual grades include:

Grade 1: Patterns, Magnetism, and Seeds
Grade 2: Insects, Sink or Float, and Measurement
Grade 3: Flight, Measurement, and Plants
Grade 4: Electricity, Kitchen Chemistry and Bio communities
Grade 5: Rocks and Minerals, Weathering, and Small Animals

The development and sequencing of content in this program differed from what might be a more conventional approach. Instead of first determining what topics would be taught at each grade level, the Task Force initially determined which of the processes of science were appropriate with youngsters at the various levels. After these were sequenced, context topics were sought which would lend themseleves to instruction utilizing those processes. Throughout this development, consideration was given to the development of the program in a manner which closely adhered to the newly formulated "Maryland Curricular Framework". The matrix in Appendix E indicates the congruence between this program and the framework which is also included.

The curriculum is supported, and indeed defined by a curriculum guide for each grade level. This not only provides a sequence of lessons, but also includes much of the teacher support materials. Masters for class handouts and other dittos are included. Incorporated into each lesson are a series of structuring questions for possible use by teachers. These assist the teacher in directing student thought toward the desired end.

Primary needs for the program are supplied to teachers in custom made kits developed for each grade level. The intent has been to provide teachers with all materials needed for the curriculum even though those same items might be readily available from other sources. As a result, such items as toothpicks, straws, sugar and the like have been supplied to teachers as part of the kit. Although these could be obtained locally at grocery stores, hardware stores and the like, a determination was made that such a teacher inconvenience would negatively impact upon the extent to which people may be able to successfully and easily implement the program.

An agreement was made with a private company which took the lessons at each grade level and developed a list of all materials required. A prototype kit for each grade level was built and evaluated by the Task Force and writing team prior to general production for classroom use. Additions, deletions and other modifications were then made with the intent of providing teachers with all materials required for the program. Appendix F provides a detailed listing of the material supplied teachers in these kits. This also simplifies the teacher's job in reordering materials which contributes to the success of the program.

Teachers have been provided with a series of trade books to supplement the curriculum at each grade level. The purpose of these is to provide additional reading and teacher support on the topics studied. Arrangements were made with Pulley Learning Associates in South Carolina to have a computerized match of the Carroll County lessons with the published materials currently on the market. From copies of the grade level curriculum guides provided them, Pulley Learning Associates generated a list of books for possible use with each topic and grade level as indicated in Appendix G. These were evaluated by teacher-writers as part of the selection process. Many were identified for classroom use with anywhere from one to ten copies provided to each teacher. Others were judged to be more appropriately housed in the library and were purchased through the Media Centers.

A similar effort has been made toward the identification of films to support the program. Teachers have been involved in the preview and evaluation of submissions from commercial vendors. Recently, a large quantity films which recommended for purchase were obtained. This process will continue for several years until adequate A-V materials have been developed to support the contents of this elementary science program.

While the basic lessons within each unit define the content to be taught by all teachers, a series of extension activities provide a basis for diversity and specialized interests. These can best be typified as follow-up activities to the initial investigation. It is these extension activities that often carry the primary lesson into the utilization of skills in the language arts, math or art areas. For instance, students may write a story or draw pictures about what they have done. At the upper grade levels, students also maintain a journal in which they record what they have done and what they found.

Many of the lessons and activities require the use of living organisms. This is particularly true in grade two where insects are studied and grade four when the pond community is investigated as a lead in to various protozoa, algae and other organisms. Also, grade five studies small animals including crayfish and fruit flies in many of the lessons.

Teachers are supplied these organisms upon demand at no charge through a system level Live Materials Culture Center. Although not all would be utilized by elementary teachers, Appendix H provides a full list of living organisms made available through the center. While most of these are available commercially, several required sets of organisms are specific to this elementary science program. For instance, grade two uses a mealworm kit which consists of a specified proportion of larva, pupa and adult beetles. Fifth grade employs the fruit fly to study population dynamics and investigates the role food supply plays. For this, a special fruit fly kit is prepared which consists of ten cultures of the organisms started at specified time periods apart. Providing these living materials from within the system has helped ensure further implementation of the program by eliminating the inconvenience and financial consideration which could become impediments.

This elementary science program has been extended to a summer enrichment program. A package of materials entitled "Summer Science Fun" has been prepared at each grade level (Appendix I). The activities included serve as both reinforcement for the concepts taught during the school year and as enrichment by the introduction of new materials going beyond that previously studied. Students who undertake this and complete the package of activities on their own or with their parents' help during the summer months have their efforts recognized with an appropriate certificate (Appendix J). Although this portion of the program is completely voluntary on the part of the students, over 44% of the youngsters and their parents requested these materials at the end of the last school year (Appendix K).

Evaluation of students in this entire elementary science curriculum is based upon both an assessment of how well they worked on designated tasks and the development of desired skills (Appendix L). An important segment of the teacher retraining effort has been directed toward building teacher skills in assessing student development of non-cognitive skills in a process oriented science program. After having taught a conceptually based program for most of their careers, many teachers found themselves writing primarily cognitive questions particularly those of a lower level. One-half day of training was devoted to the development of skills in assessing student learning in a noncognitive manner. This included the presentation of ideas and approaches that could be used as well as a writing session in which these skills were practiced by the construction of sample items. These were then compiled, reproduced and distributed to grade level teachers. Appendix M contains a sample of items drawn from one grade level. This item bank will be further expanded in the future.

One major consideration has been the communication of information about this program to the parent community as it has been implemented in schools. To that end, a 50 minute slide show has been prepared and used at PTA meetings of schools as they began the program. The primary purpose of this was to give parents both an overview of the program as well as some insight into how and why that selection was made.

As a part of that presentation, parents are presented with a slide explaining the "science concept" of the relationship between the length of a pendulum and its period. The explanation used is intentionally made as technical as possible by using such terms as "indirectly proportional", "period" and the like. As a result, relatively few parents understand this concept which they are told is taught to youngsters. This, however, leads into allowing parents to deal with that same concept in a hands-on manner. Strings of varying lengths and washers are passed out for parents to construct their own pendulum with which they determine the number of "beats" in a one minute time period. When parents hang their strings on a number line, the relationship between the length of a pendulum and its beat becomes apparent. The purpose of this activity is to give parents an opportunity to deal with the abstract, conceptual presentation of an idea as well as a hands-on experience with the same idea.

These presentations have been effective in informing parents about the new science program. The pendulum activity was a very useful ploy in helping them understand the importance of having students do science rather than just teaching a series of abstract concepts for students to memorize. During the initial attempts on this series of presentations, parents were asked to evaluate the sessions. Some of that data is included in Appendix N. Parental response for this has been quite positive. Plans are underway to have subsequent PTA presentations in

successive years in which youngsters in a class would teach to their parents the activities they had done in science.

Attempts have also been made to further generate community support for this program through a series of newspaper articles. These occurred during the pilot study, as the program was implemented and, more recently, as students received their "Summer Science Fun" activity packets. Appendix O contains several newspaper clippings that resulted.

All of these efforts have been directed toward building community support for this program. An initial assessment indicated that parental concern might be aroused because the program not only did not employ a basal text, but differed significantly from the way science had been taught in the past. As a result of this public relations effort, the program itself, or some combination thereof, initial concerns about community support have disappeared. Presently, the elementary science program is one of the most talked about and favorably viewed curriculum areas in our schools.

EVALUATION OF PROGRAM

Four types of evaluative information have been collected on this program. The first consisted of comparative data collected during the pilot study which served to contrast this program with conventional text programs. The second consisted of evaluative data relating to the effectiveness of the teacher training component associated with the elementary science program. The third involves an assessment of the extent to which teachers have implemented the new science program and have progressed through a pre-established series of stages of teacher use of the program. The fourth and last type of research data which has been gathered on this elementary science program involves the effectiveness of the coaching of teachers as they attempted to implement this new program.

In the first research effort, five basic research questions explored possible differences between this program and conventional text programs. Specifically, attempts were made to determine if the non-text approach was equivalent to a textbook-based approach in terms of:

1) the amount of hands on activity.
2) the inclusion of scientific processes.
3) the extent of student motivation.
4) the ease of program implementation.
5) the degree of teacher satisfaction.

ANOVA techniques were employed to determine treatment related differences in the response patterns of teachers to items contained in a Program Evaluation. Although the full statistical analysis and text of the report is contained in Appendix P, teachers reported more favorable perceptions regarding the

non-textbook approach than either of the other two programs included in this study. Findings related to four of the five research questions favored the hands-on, laboratory based program employing a basal text. The findings for the five research questions investigated were as follows:

QUESTION #1: AMOUNT OF HANDS-ON ACTIVITY

Teachers reported that with the lab-based, non textbook approach the "extent to which activities emphasized a direct hands-on approach" was greater than with the other two programs considered ($F(2,77) = 53.19$, $p<.001$). Similarly, they indicated that unlike the text-based programs, this approach required that the lab activities" be done to maintain the integrity of the program" ($F(2,75) = 23.84$, $p<.001$).

QUESTION #2: INCLUSION OF SCIENTIFIC PROCESSES

Teachers reported the non-textbook approach provided for greater inclusion of the scientific processes ($F(2,76) = 18.44$, $p<.001$). Furthermore, they indicated that this approach allowed for greater "discovery and experimentation on the part of students instead of being cookbook in nature" ($F(2,74) = 22.31$, $p<.001$). In addition, teacher responses indicated that neither of the text programs was as successful as the non-text approach in providing for inclusion of "activities structured so that students perform them to gain new information rather than confirm material already known" ($F(2,76 = 11.57$, $p<.001$).

QUESTION #3: STUDENT MOTIVATION

Participating teachers perceived that the "degree to which students were motivated by the program" was greater in the non-textbook approach ($F(2,76) = 18.18$, $p<.001$). Similarly, it "caused students to go beyond the assigned activity and try ideas on their own" to a greater extent ($F(2,76) = 6.08$, $p<.005$). However, no differences were perceived in the extent to which the programs "caused students to initiate questions that went beyond what had been presented" ($F(2,76) = 1.54$, $p=22$).

In addition, a student attitude survey ($r = .92$) toward the learning of science was administered to all students at both the beginning and end of each semester. It consisted of 15 Likert-type questions to which students responded on three point ("Agree", "Undecided", "Disagree") scale. The instrument consisted of eight positively worded and seven negatively worded items arranged in random order. Student responses indicated that they were more motivated by the non-text approach and the more concept oriented approach than the program studied which had more of a process and content balance ($F(2,2091) = 8.21$, $p<.001$).

QUESTION 4: EASE OF PROGRAM IMPLEMENTATION

Participating teachers indicated the non-text approach would be difficult to implement ($F(2,76) = 8.50$, $p<.001$). This, in part, resulted from the perceived fact that the non-text approach required more preparation time than either of the other two ($F(2,77) = 14.22$, $p<.001$). However, participating teachers indicated that no differences existed in the "amount to which lab materials were provided" ($F2,75) = 1.03$, $p= .36$) and the "extent to which those not provided were easily found" ($F(2,61) = 2.04$, $p=.14$).

QUESTION 5: TEACHER MOTIVATION

Teachers indicated that they were much more motivated by the non-text approach than either of the other two programs considered ($F(2,76) = 6.22$, $p<.005$). They also indicated that the non-text approach caused them "to devote more time to teaching science" ($F(2,75) = 11.57$, $p<.001$). A 20-item Likert-type questionnaire ($r=.92$) was administered to teachers to assess their attitudes toward teaching science. Subjects completed this survey at the beginning and end of each semester of this two semester study. This coincided with the beginning and end of their work with each of the programs. ANCOVA techniques indicated no program-related differences in teacher attitudes toward teaching science ($F(3,70) = 1.47$, $p=.24$).

While that research was used in making the selection of a program, several research studies have been undertaken to both assess its effectiveness and the effectiveness of the procedures used to implement it Training of teachers to implement this program was begun in August 1984 and continued throughout the two school years that followed. Evaluative data was collected on each segment. Teachers were asked to rate each day of the two day summer preservice workshop. That information in tabulated form is included in Appendix Q. Some of the problems inherent in running such a workshop surfaced during the first day with grade 1 teachers who were the initial group to be trained. That provided a basis for modifications which were used with subsequent grade level groups. The overall assessment of these workshops was most favorable. In fact, the group of forth teachers surprisingly gave perfect scores on all items.

Similar data was collected on the Follow-Up Workshops that were held at two times later in the year as contained in Appendix R. That, too, reflected a very positive reception on the part of teachers. At the end of the last session teachers were asked to provide a narrative comment upon how they perceived the new program. These comments indicated that teachers had readily accepted the program. Consistent comments were made about its hands on nature and the way students were motivated by it.

Current research considerations are directed toward an assessment of the way teachers have implemented the program. Efforts have focused upon determining the impact the coaching and training components have had. The Concerns Based Adoption Model from the University of Texas at Austin has provided the primary instrumentation. That model has been used to determine both the Levels of Use and Stages of Concerns for implementing teachers. Data has also been collected on both teacher and student attitudes. Since these studies ran through the end of the past school year, analysis of data is far from complete. One finding that is already apparent, however, is that teachers perceived the training and curriculum guides as being critical factors in the implementation of the program. When asked to rank-order nine contributing factors, teachers rated the guides as the most important, followed closely by the preservice training and coaching components of the implementation design.

FINANCIAL NEEDS

The material needs of the program are supplied by a custom designed kit for each grade level. The result has been a series of grade level kits that typically cost about $450. Generally, one kit has been provided to each teacher in the program. The exception to this has been where school staffing has involved a teaming concept where an individual teacher has taught the same unit over and over as groups of students were rotated. In such cases, a lesser number of kits may have been purchased. The total cost of these kits was $88,178 for 193 teachers in the 16 schools.

The primary on going expenditure relates to the replacement of consumable supplies in the kit. This has been expedited by replacement packages at each grade level. At the end of the past year the average cost for replacing items in kits was about $800 for an average sized elementary school. More specific costs on individual items and replacement kits can be found in Appendix F.

In addition, several other principle expenditures are required. The supplemental resource books provided for teacher use in the classroom will cost about $24,000. Another $20,000 has been spent in salaries for the two day summer training sessions for implementing teachers. Follow up workshops for those individuals as they teach the program for the first time will cost approximately $42,500. The cost of the coaching component in the first year of implementation was in the neighborhood of $10,000. Developmental use of the curriculum itself totaled about $12,000 in addition to an out lay of nearly $22,000 for the pilot study.

NEEDED CHANGES

A number of priorities have been identified for future focus:

1) During the Honors Workshop this summer, some of the lessons and teacher materials will be revised, polished and improved upon. A similar process will be undertaken on a larger scale as an adjunct to the second Honors workshop to be held in summer, 1986. At that time a "final" product will be produced - five years after its initial development.

2) Continued efforts need to be made toward the further development of the bank of evaluation items teachers might use as a resource with this program.

3) An attempt needs to be made to revise the "Summer Science Fun" packet of optional summer activities that serve as an extension of the basic program. While revisions are needed at all grade levels, an expansion of that packet of materials is required in grades three, four and five. Continued efforts need to be made toward publicizing this aspect of the program.

4) A country-wide Science Olympics should be considered. For those lessons of the program in which students are to use the data they collect in experimentation to a specific product, a Science Olympics would provide both an incentive and recognition. A number of aspects of the program such as second grades designing a clay boat that would hold the most cargo, and third grades designing a plane that would fly the furthest or an autogyro that would stay up the longest would readily lend themselves to this concept.

5) A kindergarten component of this program will be examined in the future.

APPENDIX

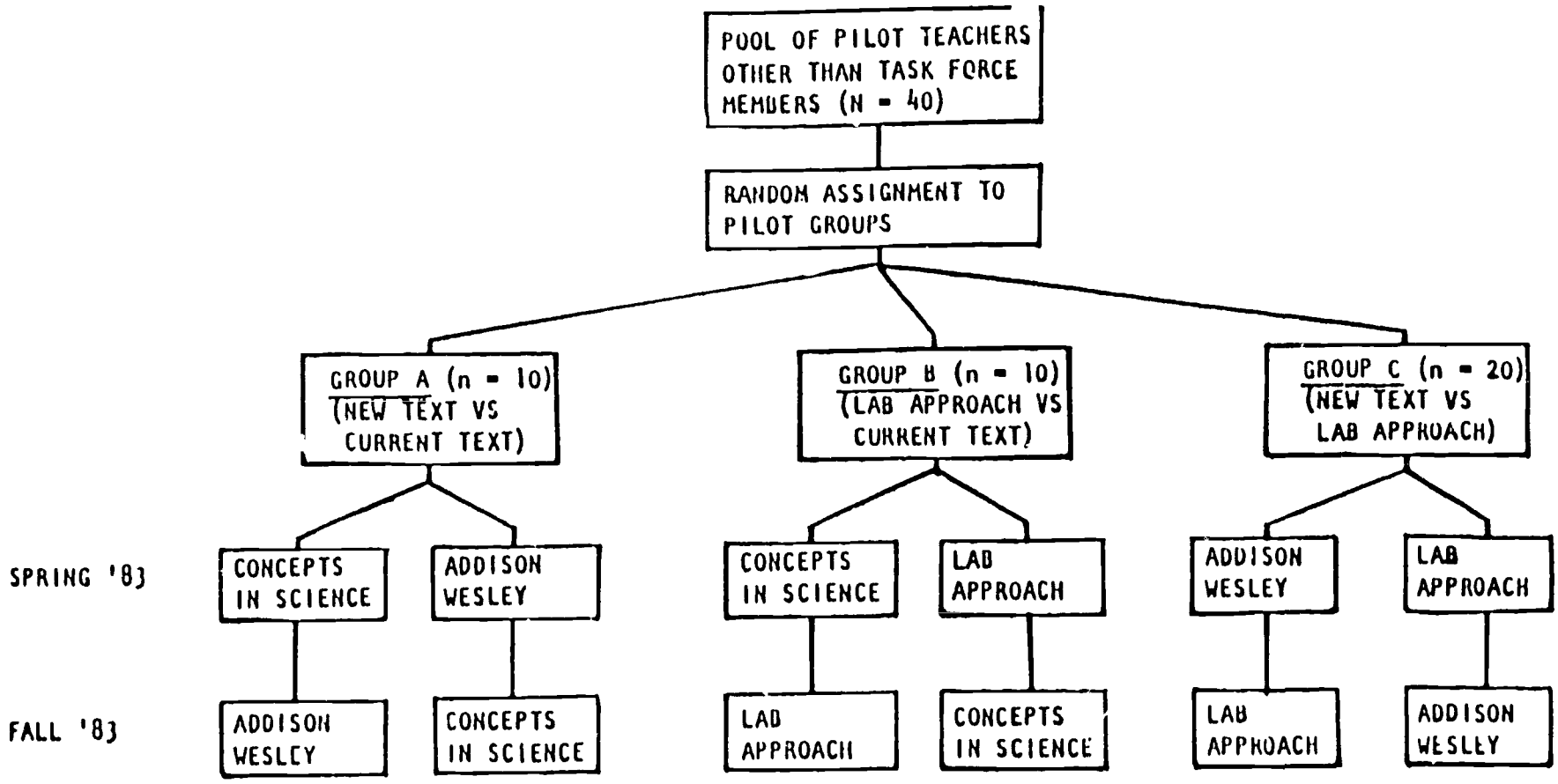
APPENDIX A:
STATEMENT OF PRINCIPLE

STATEMENT OF PRINCIPLE

Science should be an integral part of the elementary program. Instruction should incorporate a significant portion of hands-on experiences and should not be taught as either another reading assignment or the memorization of a series of facts and terms. Students should be given the opportunity to be directly involved with the scientific method and the essential processes of observing, measuring, recording, classifying, interpreting, infering, predicting, investigating and modeling. These skills should be facilitated through exposure to direct laboratory experiences, teacher or student demonstrations and supplemented by written instructional materials. Activities should be of a concrete nature and consistent with Piagetian levels of intellectual development. As a result, science instruction at the elementary level should: 1) promote the development of reasoning skills, 2) allow for the integration of motivating issues of a current nature that arouse student interest and 3) foster an understanding of appropriate language and terminology.

APPENDIX B: PILOT DESIGN

ELEMENTARY SCIENCE PILOT



EVALUATION CRITERIA:

- Teacher program evaluations
- Student attitudes toward learning science
- Changes in teacher attitudes toward teaching science

APPENDIX C:
DUTIES OF COACH

Science Graduate Assistant/Coach

Role:

1. Observe/critique/provide feedback to implementing teachers.
2. Plan lessons with teachers.
3. Provide suggestions for lab management.
4. Co-teach lessons.
5. Procure special materials/equipment.
6. Arrange for guest presenters/trips.
7. Obtain free/inexpensive materials.
8. Provide background information to supplement curriculum.
9. Organize mini-workshops in various content or process areas as needed.

A log will be kept in each school. All contacts with implementing teachers will be recorded in the log along with a description of the activity or nature of the coaching done.

BLL:ec
9/10/84

COACHIN OG

SCHOOL _____

DATE	TIME	TEACHER	ACTIVITY/TYPE OF COACHING	COMMENTS

APPENDIX D:
OPERATIONAL DEFINITIONS

DEFINITIONS FOR SCIENCE PROCESSES

OBSERVING

IDENTIFYING THE DISTINGUISHING PROPERTIES OF OBJECTS OR PHENOMENA AND COMPARING THEM ON THE BASIS OF THESE PROPERTIES. Example: GIVEN THE OPPORTUNITY TO OBSERVE SEVERAL PLANTS SHE/HE HAS NEVER SEEN, THE STUDENT WILL DESCRIBE WHAT MAKES THEM ALIKE AND DIFFERENT.

CLASSIFYING

SORTING PHENOMENA OF OBJECTS INTO CATEGORIES ACCORDING TO PROPERTIES WHICH MAY OR MAY NOT BE SPECIFIED. RECOGNIZE THAT ALL CLASSIFICATION SYSTEMS ARE ARBITRARY AND THAT ANY OBJECT OR PHENOMENA AN BE CLASSIFIED IN MANY WAYS. EXAMPLE: GIVEN A SET OF SHELLS, THE STUDENT WILL SORT THEM INTO (1) LOGICAL CATEGORIES SPECIFIED BY THE STUDENT, AND (2) BIVALVES AND UNIVALVES.

MEASURING

DETERMINING QUANTITY OF SIZE BY COMPARISON WITH ARBITRARY OR STANDARD UNITS. EXAMPLE: GIVEN SEVERAL ROCKS, THE STUDENT WILL FIND THEIR MASS TO THE NEAREST TENTH OF A GRAM, AND ORDER THEM FROM LIGHTEST OR HEAVIEST. (SIZE, VOLUME, MASS)

INFERRING

GOING BEYOND THE INFORMATION AVAILABLE TO DESCRIBE OR EXPLAIN AN OBJECT OR PHENOMENON WHICH HAS BEEN OBSERVED. EXAMPLE: AFTER OBSERVING A CHEMICAL REACTION SHE/HE HAS NEVER SEEN, THE STUDENT WILL DESCRIBE WHAT WAS SEEN AND EXPLAIN THE PHENOMENON IN TERMS OF INTERACTING PARTICLES.

PREDICTING

EXTRAPOLATING OBSERVED RESULTS TO NEW SITUATIONS. EXAMPLES: AFTER OBSERVING THE SPEED OF A CAR COMING OFF OF AN INCLINE PLANE WITH VARIOUS SLOPES, THE STUDENT WILL PREDICT THE SPEED OF THE CAR COMING OFF AN UNOBSERVED SLOPE.

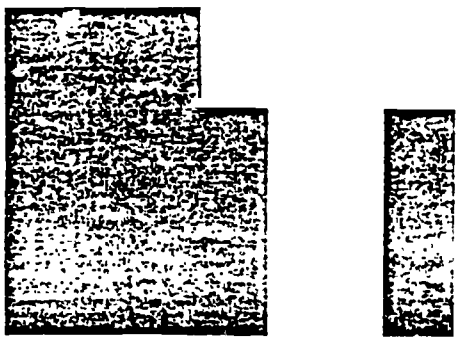
FORMING HYPOTHESES

FORMULATING A POSSIBLE EXPLANATION OF THE CAUSE(S) OF OBSERVED PHENOMENAS. THE EXPLANATION MUST BE TESTABLE BY EXPERIMENT AND BE DESIGNED TO LEAD TO AN EXPERIMENT. EXAMPLE: GIVEN A SET OF OBSERVATIONS OF THE ANNUAL TEMPERATURE AND THE ANNUAL RAINFALL IN A GIVEN REGION, THE STUDENT WILL FORMULATE A TESTABLE DESCRIPTION OF THE RELATIONSHIP BETWEEN TEMPERATURE AND RAINFALL.

APPENDIX E: STATE FRAMEWORK

ELEMENTARY SCIENCE PROGRAM/STATE FRAMEWORK MATCH

	1	2	3	4	5
1	X	X	X	X	X
1.1	X	X	X	X	X
1.2		X		X	X
1.3	X	X			X
1.4		X	X	X	X
2	X	X	X	X	X
2.1	X	X	X	X	X
2.2	X	X	X	X	X
2.3	X	X	X	X	X
2.4	X	X	X	X	X
2.5	X	X	X	X	X
2.6	X	X	X	X	X
2.7	X		X	X	X
3	X	X	X	X	X
3.1	X	X	X	X	X
3.2	X	X	X	X	X
.3	X	X	X	X	X
3.4	X	X	X	X	X
4	X		X		X
4.1	X	X	X		X
4.2	X	X	X		X
4.3	X	X	X		X
4.4					X
5	X	X			X
5.1	X	X			X
5.2	X	X			X
5.3					X
5.4	X	X	X		X



EXPECTANCIES

These learner behaviors further define what the scope of each subgoal could be. They indicate a range of outcomes that could be expected for different students by the time they have completed their science program.

Goal 1 To develop positive attitudes toward science and its relevance to the individual, society, and the environment.

Subgoal 1.1 To value science as a worthy endeavor.

The learner:

1.1.1 Displays curiosity about natural phenomena.
1.1.2 Questions myths and superstitions as well as accepted scientific findings.
1.1.3 Expresses the need for acquiring, organizing, and evaluating data.
1.1.4 Reports data objectively and submits findings to the scrutiny of others.
1.1.5 Justifies the necessity for logical thought when progressing from raw data to conclusions.
1.1.6 States the role of assumptions in scientific modeling and theory formation.
1.1.7 Expresses an awareness of the tentative nature of human knowledge.
1.1.8 Displays an interest in historical and/or contemporary scientific writings.

Subgoal 1.2 To recognize science as a human endeavor.

The learner:

1.2.1 States contributions to science and technology made by men and women of various ethnic groups and cultures.
1.2.2 Describes relationships between science and other areas of human endeavor.
1.2.3 Illustrates that scientific endeavor involves cooperation among individuals and groups.
1.2.4 Describes how human traits influence the strengths and limitations of scientific inquiry.
1.2.5 Lists examples of how scientists perceive the world in unique ways involving both direct and indirect observations.
1.2.6 Identifies factors such as funding, preparation, resources, time, and effort that influence scientific achievement.

Subgoal 1.3 To exhibit awareness of the orderliness and aesthetics in the environment.

The learner:

1.3.1 Identifies patterns in the environment.
1.3.2 Describes how humans have created schemes or patterns in their attempt to understand order in nature.
1.3.3 Describes how people interpret the aesthetics and orderliness of the natural and technological world in their creative work.
1.3.4 Describes feelings about aesthetic aspects of the natural and technological world.

Subgoal 1.4 To recognize interactions among science, technology, and society.

The learner:

1.4.1 Distinguishes science from technology.
1.4.2 Describes how the achievements of science and technology, when properly used, are basic to the advancement of human welfare.
1.4.3 Describes the consequences of past scientific and technological developments.
1.4.4 Considers the implications of new scientific and technological advancements.
1.4.5 Examines, in a critical way, print and non-print coverage of scientific issues.
1.4.6 Makes consumer decisions based on the findings of scientific research.
1.4.7 Formulates positions on environmental issues after consideration of available scientific information.
1.4.8 Demonstrates an appreciation and respect for living organisms.
1.4.9 Describes how science has enabled people to recognize their interrelationship with the environment.

Goal 2 To develop and apply, through science experiences, rational and creative thinking processes for problem solving.

Subgoal 2.1 To use observation to investigate the environment.

The learner:

2.1.1 Uses the senses to examine objects and events.
2.1.2 Identifies changes in objects and events.
2.1.3 Describes objects and events in comparative terms.
2.1.4 Discriminates observations from inferences.
2.1.5 Uses background knowledge to enhance the observation of objects and events.
2.1.6 Recognizes the need for appropriate instrument(s) to aid in observation.
2.1.7 Performs long-term observations.
2.1.8 Makes repeated observations to establish reliability.

Subgoal 2.2 To use questions for defining problems.

The learner:

2.2.1 Formulates questions from observations.
2.2.2 Identifies a question as testable or non-testable.
2.2.3 Defines a specific problem.

Subgoal 2.3 To use hypotheses as predictive tools.

The learner:

2.3.1 Predicts events or conditions based on observation and/or inference.
2.3.2 Identifies and applies appropriate information during hypothesis generation.
2.3.3 Generates testable hypotheses.

Subgoal 2.4 To conduct scientific investigations.

The learner:

2.4.1 Follows directions to complete a scientific procedure.
2.4.2 Identifies relevant variables in an investigation.
2.4.3 Distinguishes controlled variables from manipulated variables in an investigation.
2.4.4 Utilizes relevant information for establishing investigative procedures.
2.4.5 Identifies the importance of adequate sample size.
2.4.6 Identifies the importance of repeated trials.
2.4.7 Designs an investigation with one or more manipulated variables.

Subgoal 2.5 To organize data for the identification of trends and patterns.

The learner:

2.5.1 Identifies similarities and differences in a set of objects or events.
2.5.2 Groups objects and events according to similarities and differences.
2.5.3 Constructs a classification system to aid in grouping and identifying objects and events.
2.5.4 Employs accredited classification systems to aid in identifying objects and events.
2.5.5 Employs quantitative measurement as a criterion for analyzing data.
2.5.6 Arranges objects or events in sequence according to a particular criterion.
2.5.7 Determines appropriate procedures for analyzing data.
2.5.8 Employs graphs and figures to identify trends in experimental data.
2.5.9 Develops mathematical relationships from experimental data.

Subgoal 2.6 To use experimental evidence for evaluating hypotheses.

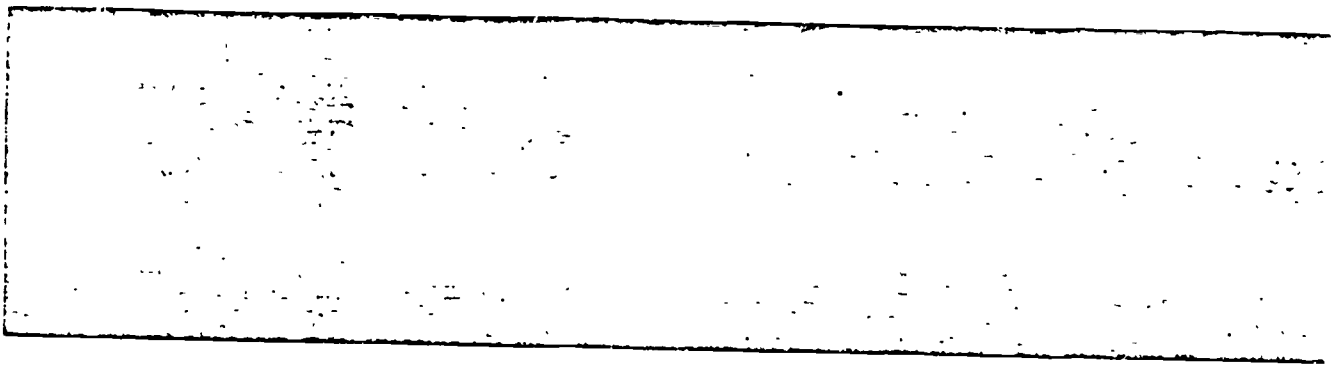
The learner:

2.6.1 Formulates conclusions from experimental data.
2.6.2 Compares results with predictions.
2.6.3 Discriminates significant from nonsignificant data.
2.6.4 Accepts or rejects hypotheses on the basis of experimental evidence.
2.6.5 Determines the validity of experimental procedures.

Subgoal 2.7 To apply the results of inquiry and critical thought.

The learner:

2.7.1 Uses patterns and trends derived from experimental data as a basis for examining related problems.
2.7.2 Reviews hypotheses after further observations.
2.7.3 Uses the results and conclusions of an experiment as a starting point for further investigation.



Goal 3 To employ the language, instruments, and materials of science for collecting, organizing, and communicating information.

Subgoal 3.1 To apply the appropriate skills and mathematical techniques necessary for collecting, organizing, and interpreting data.

The learner:

3.1.1 Observes characteristics of living and non-living things.
3.1.2 Classifies observational information into useful categories.
3.1.3 Quantifies information obtained from observations.
3.1.4 Obtains scientific information from a variety of sources.
3.1.5 Organizes information and data through the use of tables, charts, and graphs.
3.1.6 Interprets information from tables, charts, and graphs.
3.1.7 Uses appropriate mathematical manipulations to convert data into other useable forms.
3.1.8 Interpolates and extrapolates data.
3.1.9 Develops generalizations and predictions using the results of data analysis.
3.1.10 Assesses, within experimental error, the validity of conclusions established from an analysis of data.

Subgoal 3.2 To communicate in a manner that is consistent with scientific procedures.

The learner:

3.2.1 Utilizes listening skills for receiving information.
3.2.2 States questions, hypotheses, and working assumptions in a concise manner.
3.2.3 Employs scientific vocabulary when communicating ideas.
3.2.4 Explains methods and procedures used to conduct investigations.
3.2.5 Uses tables, charts, and graphs to communicate ideas.
3.2.6 Writes investigative reports which are supported by data and references.
3.2.7 Orally presents investigative reports which are supported by data and references.
3.2.8 Conveys accurately the findings and conclusions of laboratory investigations.

Subgoal 3.3 To use laboratory apparatus in a skillful manner.

The learner:

3.3.1 Manipulates tools of observation.
3.3.2 Selects appropriate tools for observation.
3.3.3 Manipulates tools of measurement.
3.3.4 Selects appropriate tools for measurement.
3.3.5 Manipulates tools used in material preparation and handling.
3.3.6 Selects appropriate tools for material preparation and handling.
3.3.7 Designs tools and apparatus as appropriate for science investigations.
3.3.8 Records data in a form which reflects the accuracy of tools and instruments.

Subgoal 3.4 To demonstrate proper techniques for handling, manipulating, and caring for science materials.

The learner:

3.4.1 Practices established safety procedures in all scientific work.
3.4.2 Maintains appropriate life-supporting environments for plants and animals.
3.4.3 Cares for organisms in a responsible and legal manner.
3.4.4 Demonstrates proper techniques for cleaning, storage, and disposal of science materials.

Goal 4 To acquire and apply scientific knowledge—its concepts, theories, principles, and laws—to interpret the natural world.

Subgoal 4.1 To describe the nature of science.

The learner recognizes that:

4.1.1 Science is founded on the premise that all things, including "self-evident truths," are open to question.

4.1.2 Science searches for fundamental laws that apply throughout time and space.
4.1.3 Science is unique by virtue of its procedures for generating knowledge, and the nature of this knowledge.
4.1.4 Scientific progress depends upon experience and the accumulation of knowledge.
4.1.5 Scientific knowledge is tentative and is subject to continual review.
4.1.6 Scientific knowledge requires accurate measurements and observations, either direct or indirect. Scientific endeavors require the honest and objective reporting and verifying of procedures, data, results, and conclusions of observation and experimentation.
4.1.8 Scientific inquiry is influenced by the beliefs, traditions, views, and actions of society.
4.1.9 Theories in science, whether logically derived or intuitively developed, are evaluated for their ability to explain past, present, and future phenomena.

Subgoal 4.2 To acquire and apply knowledge of the physical sciences—their concepts, theories, principles, and laws.

The learner:

4.2.1 Describes the properties of matter making use of length, mass, time, and frames of reference.
4.2.2 Distinguishes among the known fundamental forces in the universe.
4.2.3 Describes the motion of objects in terms of position, displacement, forces, velocity, acceleration, and time.
4.2.4 Discusses energy in its various forms and its interaction with matter.
4.2.5 States the properties of waves as they relate to transmission, interference, production, and absorption.
4.2.6 Describes electric, magnetic, and electromagnetic phenomena.
4.2.7 Identifies the atomic characteristics of matter.
4.2.8 Describes the concepts of astronomy from the viewpoint of physical science relationships.
4.2.9 Classifies samples of matter by their characteristic physical and chemical properties.
4.2.10 Interprets energy effects associated with physical and chemical changes.
4.2.11 Describes solutions qualitatively and quantitatively.
4.2.12 Interprets chemical information conveyed by chemical formulas and equations.
4.2.13 Performs calculations based on chemical equations including equilibrium systems.
4.2.14 Interprets behavior of matter in terms of the kinetic molecular theory.
4.2.15 Describes physical and chemical properties of elements from their placement on the periodic table.
4.2.16 Associates chemical behavior with electronic configurations of the atoms involved.
4.2.17 Explains the properties of substances in terms of the forces of attraction found within the materials.
4.2.18 Describes major categories of chemical reactions including: precipitation, acid-base, oxidation-reduction, complexation.
4.2.19 Accounts for the properties of characteristic organic compounds in terms of their structures and functional groups.

Subgoal 4.3 To acquire and apply knowledge of the life sciences—their concepts, theories, principles, and laws.

The learner:

4.3.1 Describes the characteristics of living things.
4.3.2 Describes structure and function in cells.
4.3.3 Describes processes by which matter enters and is transported throughout organisms.
4.3.4 Describes processes by which organisms capture, utilize, and release energy.
4.3.5 Describes processes by which internal balance of an organism is controlled.
4.3.6 Describes how an organism reproduces and transmits traits.
4.3.7 Describes the growth and development of organisms.

4.3.8 Describes how living things sense and respond to stimuli.
4.3.9 Describes biological aspects of the human species.
4.3.10 Describes species interaction and adaptation to an environment.
4.3.11 Describes the evolution of organisms.

Subgoal 4.4 To acquire and apply knowledge of the earth sciences—their concepts, theories, principles, and laws.

The learner:
4.4.1 Describes properties of minerals.
4.4.2 Describes characteristics of major rock types.
4.4.3 Relates crustal processes to landform developments.
4.4.4 Examines the determination and divisions of geologic time.
4.4.5 Examines the dynamics and effects of weather.
4.4.6 Explains how water affects various earth processes.
4.4.7 Examines the dynamics of the ocean system.
4.4.8 Describes the dependence of society on geologic resources.
4.4.9 Describes the earth's relationship to other astronomical bodies.

Goal 5 To utilize science experiences in the planning and fulfillment of personal aspirations and career decisions.

Subgoal 5.1 To relate science concepts and skills to vocations and avocations.

The learner:
5.1.1 Identifies science-related vocations and avocations.
5.1.2 Applies science skills and concepts to vocational situations and avocational pursuits.

Subgoal 5.2 To view persons in a variety of science-related vocations and avocations as role models.

The learner:
5.2.1 Gives examples of people of both sexes in various age levels and ethnic groups who have made contributions to science and technology
5.2.2 Demonstrates an awareness of work experiences of people in scientific vocations.
5.2.3 Identifies persons in the community who have science-related vocations and avocations.

Subgoal 5.3 To demonstrate vocational planning skills.

The learner:
5.3.1 Relates present science experiences to vocational requirements.
5.3.2 Uses resource information to examine potential vocations in science.
5.3.3 Identifies the various qualifications required for science vocations.
5.3.4 Examines vocations in science by considering personal interests, attitudes, and aptitudes.
5.3.5 Describes trends in the science and technology job markets.

Subgoal 5.4 To participate in creative science experiences that may enhance one's self-concept.

The learner:
5.4.1 Successfully completes a self-initiated classroom science investigation.
5.4.2 Successfully completes an independent science project.
5.4.3 Participates constructively in a group science activity.
5.4.4 Demonstrates divergent thinking during scientific inquiry.
5.4.5 Identifies with the creative human processes employed in the innovative use of resources and technology.

APPENDIX F:
KIT CONTENTS

ELEMENTARY SCIENCE

REPLACEMENT PARTS

SCHOOL/COST CENTER _____

PRINCIPAL'S SIGNATURE _____

TOTAL AMOUNT FROM MATERIALS LIST _____

SUPERVISOR'S SIGNATURE _____

TOTAL AMOUNT FROM SUPPLEMENTAL FORMS _____

CODE _____

CCPS

CARROLL COUNTY PUBLIC SCHOOLS
55 North Court Street
WESTMINSTER, MARYLAND 21157

SPRING 1985

CARROLL COUNTY ELEMENTARY SCIENCE
REFILL PACKAGE
PRICE LIST

GRADE 1	REFILL PACKAGE COMPLETE KIT	$82.85
	REFILL PACKAGE FOR PATTERNS	20.00
	REFILL PACKAGE FOR MAGNETISM	30.00
	REFILL PACKAGE FOR SEEDS	40.00
GRADE 2	REFILL PACKAGE COMPLETE KIT	$43.66
	REFILL PACKAGE FOR INSECTS	22.00
	REFILL PACKAGE FOR SINK AND FLOAT	17.00
	REFILL PACKAGE FOR TIME	8.00
GRADE 3	REFILL PACKAGE COMPLETE KIT	$76.32
	REFILL PACKAGE FOR BASIC SOILS	18.00
	REFILL PACKAGE FOR MEASUREMENT	25.00
	REFILL PACKAGE FOR PLANTS, SEEDS ETC.	35.00
	REFILL PACKAGE FOR PHYSICS OF FLIGHT	10.00
GRADE 4	REFILL PACKAGE COMPLETE KIT	$76.18
	REFILL PACKAGE FOR BIO-COMMUNITIES	3.00
	REFILL PACKAGE FOR ELECTRICITY	24.00
	REFILL PACKAGE FOR CHEMISTRY	52.00
GRADE 5	REFILL PACKAGE COMPLETE KIT EARTH SCIENCE	$57.69
	REFILL FOR SOIL TEST KIT	25.17

DELTA EDUCATION INC.
P.O. BOX M
NASHUA, NEW HAMPSHIRE, 03061

CARROLL COUNTY, MARYLAND
SCIENCE LAB KIT GRADE 1
PATTERNS, SEEDS, MAGNETISM

QUANTITY IN KIT	DESCRIPTION/PKG QUANTITY	ORDER NO.	UNIT PRICE	QUANTITY ORDERED	TOTAL PRICE
DRAWER 1					
1	STAMP PAD WATER SOL.2	PAD900	3.00		
1	MAGIC MARKER	PEN008	.75		
15	HAND LENSE	MAG025	.95		
*1 PKG.	SEED VARIETY	SEE041	1.40		
*1 PKG.	CARBON PAPER	207-1098	4.14		
1	PATTERN BLOCKS T.G.	GUI027	4.35		
30	MIRRORS	PAB002	2.00		
*1 PKG.	1/2" GRID PAPER P/100	PAP907	5.00		
*1 PKG.	1" GRID PAPER P/100	PAP906	5.00		
1 SET	UPPER CASE LETTERS PATTERNS 3" A - Z	PAT901	4.00		
*1 PKG.	ACRYLIC PAINT 2 TUBES 2 DIFFERENT COLORS	PAI900	2.85		
DRAWER 2					
6	FLASHLIGHT	FLA005	1.95		
12	D-BATTERIES	BAT001	.40		
1	CLAY 1 LB	CLA006	2.40		
DRAWER 3					
*2 PKGS.	STYROFOAM CUPS P/25	CUP012	1.95		
6 PKGS.	SMALL STYROFOAM BALLS P/6	BAL007	1.15		
*3 PKGS.	STRAWS P/40	STR001	.75		
1	PATTERN BLOCKS	PAB001	23.25		
1 PKG.	PAPER PLATES P/35	PLA006	1.80		
DRAWER 4					
*2 PKGS.	LG. SEEDS SET	SEE041	1.40		
*1 PKG.	LIMA BEANS	SEE024	2.50		
*1 PKG.	PUMPKIN SEEDS	SEE011	1.30		
*2 PKGS.	RADISH SEED (1)	SEE029	.60		
*1 PKG.	SQUASH SEEDS	SEE004	1.40		
*1 PKG.	MUNG BEANS	SEE015	.60		
*1 PKG.	PINTO SEEDS	SEE043	1.20		
*1 PKG.	BEETS SEEDS	SEE018	.60		
*1 PKG.	CORN SEEDS	SEE006	.60		
1 PKG.	PAPER FASTENERS	FAS003	3.25		
*5 PKG.	PLANTER CUPS P/6	CUP009	1.65		
*1 PKG.	PEPPERCORNS P/35	SEE904			
*1 PKG.	MUSTARD SEEDS	SEE012	1.20		

*1 PKG.	PEA SEEDS	SEE008	.60		
*1 PKG.	COFFEE BEANS P/35	SEE905			
1 PKG.	MORTAR AND PESTLES P/2	204-1011	1.50		
*8 BTLS.	GLUE 4 OZ	GLU003	1.40		
1	PARING KNIFE	KNI901	4.65		
7 PCS.	FELT PIECE	CL0903	.66		
1 PKG.	PETRI DISHES P/8	208-1040	3.15		
DRAWER 5					
1 PKG.	PAPER PLATES P/35	PLA006	1.80		
*1 PKG.	ZIPLOCK BAGS P/50	BAG028	4.00		
5 PKGS.	PLANTER BASES P/6	BAS006	2.00		
4	SPRINKLER BOTTLES	204-1029	.75		
DRAWER 6					
1 PKG.	RUBBERIZED MAGNETS P/25	MAG008	6.80		
6	HORSESHOE MAGNETS	MAG032	3.75		
*1 PKG.	PAPER CUPS P/50	CUP020	3.80		
*30	SMALL PAPER BAGS	8091	.05		
*1	ALUMINUM FOIL	FOI009	2.95		
3 PKGS.	NAILS, ALUM.& STEEL P/12	NAI007	.60		
1	WASHERS P/100	WAS002	4.00		
2	IRON FILINGS P/150G	IR0001	1.65		
1	RUBBER CLOVE	GL0901			
1	WOOD BLOCK 3"x5"x1/8	BL0902	1.50		
1	WOOD BLOCK 3"x5"x1"	BL0903	1.50		
1	SM. METAL PIE PAN 3" DIAMETER	PAN901	3.75		
1	ALUM. CAKE PAN 8x11	PAN004	1.40		
1 PKG.	ACETATE SHEET P/4	3212	1.25		
12	BAR MAGNET	MAG019	3.95		
5	CORKS P/5	ST0005	1.00		
DRAWER 7					
*4 PKGS.	PAPER CLIPS P/100	CLI020	.75		
*1 PKG.	PLASTIC BAGS P/32	BAG006	2.00		
2 PKG.	TACKS 1 PKG.	TAC001	1.00		
1 PKG.	PINS P/120	PIN003	1.50		
1 PKG.	TOOTHPICKS	TO0002	.70		
1 PKG.	RUBBERBANDS 2 OZ	BAN009	1.40		
*1 BALL	STRING	STR012	.90		
2 PKGS.	PIPE CLEANERS P/50	CLE001	.75		
1 PKG.	PAPER FASTENERS	FAS003	3.25		
1 PKG.	CLAY 1 LB, 4 COLORS	CLA006	2.40		
2 PKG.	MAGNETIC TAPE	TAP002	1.20		

*1 PKG.	SM. ZIPLOCK BAGS P/50	BAG028	4.00	_____	_____
10	PLEXIGLASS SQUARE	GLA902	.60	_____	_____
1 SET	ESS MIRROR CARD SET	KIT905	33.70	_____	_____
*1 PKG.	FOOD COLOR SET/4	COL002	2.50	_____	_____
1 PKG.	MEDICINE DROPPERS P/12	DRO001	3.20	_____	_____
*1 PKG.	1/2" FLUORESCENT ORANGE DOTS P/100	DOT901	3.00	_____	_____
1 PKG.	COMPASS P/12	COM001	7.95	_____	_____
*1 ROLL	SCOTCH TAPE	TAP006	1.00	_____	_____
*1 CAN	SPRAY GLUE	249-1118	5.55	_____	_____
LG. WHITE	CONTAINER				
30	GEOBOARD	120-7139	2.25	_____	_____
3 PKGS.	STYROFOAM TRAYS P/12	TRA001	2.10	_____	_____
OPTIONAL	PLASTIC TRAYS P/4 (NOT IN KITS BUT AVAILABLE)	202-1014	4.25	_____	_____
1 PKG.	PAPER TOWEL	TOW002	2.50	_____	_____
*2 PKGS.	STYROFOAM CUPS P/25	CUP012	1.95	_____	_____
BROWN SHIPPER					
*1 PKG.	SAND P/ 16LB.	SAN005	3.75	_____	_____
3 PKGS.	POTTING SOIL P/ 12LB	SOI002	2.90	_____	_____

NOT A PART OF THE CARROLL COUNTY SCIENCE PROGRAM BUT AVAILABLE FROM DELTA EDUCATION INC.

Class Kit	ATTRIBUTE GAMES AND PROBLEMS	KIT064	$20.95	
	TEACHER'S GUIDE	GUI010	$17.30	TOTAL$38.25

* CONSUMABLE MATERIALS CONTAINED IN REFILL PACKAGES

CARROLL COUNTY, MARYLAND
SCIENCE LAB KIT GRADE 2
SINK AND FLOAT, INSECTS, METRIC LENGTH/TEMPERATURE, TIME

QUANTITY IN KIT	DESCRIPTION/PKG QUANTITY	ORDER NO.	UNIT PRICE	QUANTITY ORDERED	TOTAL PRICE
DRAWER 1					
4 PKGS.	FLUTED CONTAINERS 1/2 GAL. P/10	CON008	3.10		
2 PKGS.	PLASTIC 2 IN. W/COVER P/20	CON012M	3.00		
3 PKGS.	STYROFOAM TRAYS P/12	TRA001	2.10		
OPTIONAL	PLASTIC TRAYS P/4 (NOT IN KIT BUT AVAILABLE)	202-1014	4.25		
DRAWER 2					
1 BALL	STRING	STR012	.90		
1 PKG.	WASHERS P/100 3/4IN.	WAS002	4.00		
1 PKG.	PAPER CUPS P/50	CUP003	3.85		
*1 BTL.	LIQUID DETERGENT 10 OZ	DET002	1.70		
1 PKG.	COFFEE STIRERS P/32	STI001	1.25		
1 PKG.	STRAIGHT PINS P/120	PIN003	1.50		
*1 ROLL	MASKING TAPE 3/4IN.	TAP0041	1.55		
2 PKGS.	TUMBLERS, 8 OZ, P/12	TUM001	2.15		
DRAWER 3					
1 PKG.	WASHERS P/100,3/4IN.	WAS002	4.00		
1 BOX	PAPER CLIPS P/100	CLI020	.75		
1 ROLL	WAX PAPER	PAP007	1.80		
1 PKG.	CERAMIC WEIGHTS P/3 LB	WEI001	4.90		
1 ROLL	ALUMINUM FOIL 12IN.	FOI006	1.95		
1	RULERS P/30	3133	9.00		
1 PKG.	PIE PANS P/10	PLA001	2.10		
1 PKG.	STYROFOAM CUPS P/25	CUP012	1.95		
*1 PKG.	CHART PAPER P/2	CHA013	1.30		
1	LG. PLASTIC DROP CLOTH	CLO902	2.00		
100	SINKERS, VARIOUS SIZES	SIN902	15.00		
DRAWER 4					
1 PKG.	SPONGES P/8	SPO010	2.75		
1 PKG.	MARBLES P/60 3/4IN.	SPH006	2.50		
2 PKGS.	POPSICLE STICKS P/30	STI014	.35		
*1 BOX	STRAWS P/40	STR001	.75		
2 PKGS.	CORKS P/5 #13	ST0005	1.00		
1 PKG.	RUBBER BANDS 2 OZ ASSORTED	BAN009	1.40		
1 PKG.	PLASTIC SPOONS P/32	SPO007	.90		
1 PKG.	ALUMINUM CUPS P/48	CUP008	1.10		
2 PKG.	BIRTHDAY CANDLES	220-1012	.90		
30	ERASERS	ERA001	.30		

DRAWER 5					
*1 PKG.	CHART PAPER P/2	CHA013	1.30		
3 PKG.	DARNING NEEDLES P/10	NEE001	1.80		
7	TROWEL	SHO002	2.10		
*1 PKG.	LABELS P/100	LAB007	1.75		
*1 ROLL	MASKING TAPE .IN.	TAP001	1.55		
*1 PKG.	1 IN. GRAPH PAPER P/100	PAP906	2.00		
3 BOXES	BRASS FASTENERS #3 P/100	FAS002	1.80		
100	MANILA FOLDER (1)	FOL901	.15		
30	HAND LENSE	MAG025	.95		
*50	LUNCH BAG	8091	.05		
*3 BALLS	STRING, 1 BALL	STR012	.90		
1	X-ACTO KNIFE W/BLADE	KNI902	4.50		
*1 PKGS.	TUBULAR CHEESE CLOTH IN COLORS 30 - 24IN.	NET902	5.00		
*1 PKG.	HANGER (FROM CLEANERS) P/30	HAN901	1.00		
DRAWER 6					
*2 ROLLS	MASKING TAPE 1 IN.	TAP901	1.55		
1	METRIC RULER P/50 WOOD	3133	9.00		
*3 BALLS	STRING, 1 BALL	STR012	.90		
30	CELCIUS THERMOMETERS	THE005	1.60		
1 ROLL	TRANSPARENT TAPE	TAP006	1.00		
1 PKG.	DEMO PAPER THERMOMETERS P/3	95941	9.50		
CONTAINER BOX SINK/FLOAT, TEMPERATURE					
8	DISH PANS 2 GAL.	PAN001	2.20		
2 PKG.	STYROFOAM CUPS P/25	CUP012	1.95		
CONTAINER BOX SINK/FLOAT, INSECTS					
15	6-LITER CONTAINER	205-1023	2.80		
8 PKGS.	6-LITER CONTAINER LIDS P/2	201-1061	2.40		
1 PKG.	PAPER CUPS P/50	CUP003	3.85		
30	SHOE BOX W/COVER PAPER	BOX015	1.00		
CONTAINER BOX SINK AND FLOAT					
*6 PKG.	SALT P/3 LB. COARSE	SOD008	2.40		
*10 PKG.	CLAY 1 LB. PLASTICINE	CLA003	2.00		
3 PKG.	PAPER TOWELS	TOW002	2.50		
METERSTICK BOX					
3 PKG.	METERSTICKS P/10	MET008	9.00		

*CONSUMABLE MATERIALS CONTAINED IN REFILL PACKAGE

CARROLL COUNTY, MARYLAND
SCIENCE LAB KIT GRADE 3
PLANTS, SEEDS, MOLDS, SOILS, MEASUREMENT, PHYSICS OF FLIGHT

QUANTITY IN KIT	DESCRIPTION/PKG QUANTITY	ORDER NO.	UNIT PRICE	QUANTITY ORDERED	TOTAL PRICE
DRAWER 1					
*2 PKG.	RADISH SEEDS 1 PKG.	SEE029	.60		
*1 PKG.	CHART PAPER P/2	CHA013	1.30		
*2 PKG.	LIMA BEAN SEEDS 1 PKG.	SEE024	2.50		
10	HAND LENSES (1)	MAG025	.95		
*1 BOX	TOOTHPICKS 1 BOX	TOO002	.70		
6	TROWELS (1)	SHO002	2.10		
1 PKG.	PINS P/120	PIN003	1.50		
*1 PKG.	NAVY BEANS	SEE035	1.20		
*1 PKG.	MUNG BEANS	SEE015	.60		
*1 PKG.	RED KIDNEY BEANS	SEE014	1.70		
*1 PKG.	PINTO SEEDS	SEE043	1.20		
1 PKG.	PLASTIC KNIVES P/30	KNI001	.50		
*1 PKG.	LABELS P/100	LAB007	1.75		
1 PKG.	EYE DROPPERS P/12	DRO002	3.00		
1 PKG.	PLASTIC SPOONS P/32	SPO001	1.35		
*1 BTL.	RED FOOD COLOR, 2 OZ	COL003	1.10		
*1 BTL.	BLUE FOOD COLOR, 2 OZ	COL010	1.10		
3 PKG.	NEEDLES, BLUNT P/10	NEE001	1.80		
*2 PKG.	GRAPH PAPER P/3	PAP014	1.50		
DRAWER 2					
15	HAND LENSES (1)	MAG025	.95		
8	MEASURING CUPS (1)	CUP007	.50		
1 PKG.	NAILS P/15	NAI003	.60		
3 PKG.	FLUTED CONTAINERS P/10	CON008	3.10		
DRAWER 3					
6 PKGS.	PLANTER CUPS P/6	CUP009	1.65		
6 PKGS.	PLANTER BASES P/6	BAS006	2.00		
6	JARS W/LIDS (1)PLASTIC	JAR009	1.30		
3 PKGS.	TUMBLERS P/12	TUM001	2.15		
DRAWER 4	PLANTS				
*6 PKGS.	PEA SEEDS 1 PKG.	SEE003	.60		
*7 PKGS.	ZIPLOCK BAGS P/5	228-1046	1.10		
*35	BUSINESS ENVELOPES	ENV901	1.80		
6 PKGS.	PLASTIC TUMBLERS P/6	TUM003	1.20		
3 PKGS.	PETRI DISHES P/8	208-1040	3.15		
3 PKGS.	STYRO AM TRAYS P/12	TRA001	2.10		
OPTIONAL	PLASTIC TRAYS P/4	202-1014	4.25		
	(NOT INCLUDED IN KIT BUT AVAILABLE)				

DRAWER 5					
10	JACK BALLS (1)	BAL905	.75		
5 PKGS.	6 D NAILS P/30	NAI002	.90		
160	4 D NAILS	NAI902	4.80		
2	BALL, 1 SET OF 3 SIZES STYROFOAM	BAL900	2.00		
10	PING PONG BALL (1)	BAL014	.60		
1 PKG.	MARBLES P/60	SPH006	2.50		
10	TENNIS BALL (1)	BAL017	1.30		
*2 PKGS.	CHART PAPER P/2	CHA013	1.30		
*3 BOXES	PAPER CLIPS P/100	CLI020	.75		
50	BOTTLE CAPS P/32	CAP002	1.50		
2 PKGS.	TACKS 1 PKG.	TAC001	1.00		
3 PKGS.	CLOTHESPINS P/10	PIN006	2.15		
*1 PKG.	BRASS FASTENERS P/100	FAS003	3.25		
1 PKG.	PINS P/120	PIN003	1.50		
*1 PKG.	STRAWS P/40	STR001	.75		
1 PKG.	METRIC RULERS P/30	3133	9.00		
*3 ROLLS	MASKING TAPE, 3/4IN.	TAP004	1.70		
1	X-ACTO KNIFE W/BLADE	NET902	5.00		
DRAWER 6					
3 PKGS.	PAPER CLIPS P/100	CLI020	.75		
*30	ONION SKIN SHEETS,8.x11	PAP905	1.50		
*1 ROLL	CELLOPHANE TAPE	TAP006	1.00		
*1 PKG.	PAPER SOUFFLE P/50	CUP004	1.45		
1 BALL	STRING	STR012	.90		
1 PKG.	WASHERS P/100	WAS002	4.00		
6 PKG.	CLOTHESPINS P/6	PIN001	1.40		
36	PLASTIC CHECKERS	CHE901	4.0		
35	PLASTIC SHEETS	SHE902	4.00		
35	MUSLIN CLOTH	CLO904	10.50		
CONTAINER BOX					
15	METAL CANS (1)	CAN909	1.25		
*1 PKG.	PAPER CUPS P/50	CUP003	3.85		
25	POSTER BOARD	BOA911			
*1 PKG	CARDBOARD,32x32CM P/15	CAR902	2.50		
*1 PKG.	CARDBOARD, 3x50CM P/15	CAR903	2.50		
1	TRUNDEL WHEEL	TRU300	15.50		
*3 PKGS.	CONSTRUCTION PAPER 12x18, P/6	PAP022	1.50		

MEASUREMENT BOX					
1 PKG.	METERSTICKS P/10	MET008	9.00	_____	_____
SAND AND SOIL BOX					
*5 PKGS.	CLAY SOIL P/2. LB.	SOI009	2.90		
*5 PKGS.	HUMUS SOIL P/50G	SOI011	1.95	_____	_____
*10 PKGS.	SAND 1 KG	SAN007	.80	_____	_____
				_____	_____
SOIL BOX					
*5 PKGS.	POTTING SOIL P/10LB	SOI006	1.75	_____	_____

*CONSUMABLE MATERIALS CONTAINED IN THE REFILL PACKAGES

CARROLL COUNTY, MARYLAND
SCIENCE LAB KIT GRADE 4
CHEMISTRY, BIO COMMUNITIES, ELECTRICITY

QUANTITY IN KIT	DESCRIPTION/PKG QUANTITY	ORDER NO.	UNIT PRICE	QUANTITY ORDERED	TOTAL PRICE
DRAWER 1					
*1 BOX	CORN STARCH 1LB BOX	STA007	1.00		
*1 PKG.	BAKING POWDER P/10 OZ	SOD018	.95		
1 BOX	WAX PAPER	PAP007	1.80		
*1 BTL.	AMMONIA 1 PINT	AMM003	.95		
4 PKG.	VIALS P/4	212-1025	1.00		
2 PKG.	VIAL CAP RIMS P/8	206-1051	.85		
2 PKG.	WIRE SCREENS, 6"x6" COARSE 2 SIZES P/8	208-1059	5.50		
2 PKG.	WIRE SCREENS, 6"x6" FINE 2 SIZES P/8	207-1055	5.50		
*1 LB.	GRAVEL (100 PLUS)	GRA001	.50		
*1 LB.	SAND	SAN006	.40		
1	BOWL (1 QT. W/COVER)	CON002M	.30		
1	WOODEN SPOON	SPO019	.75		
*2 BTL.	COOKING OIL, 16 OZ	245-1016	3.20		
1	PITCHER 3 QT.	PIT001	1.60		
*1 BTL.	MILK OF MAGNESIA 1 QT	MIL001	2.50		
2 PKG.	POPSICLE STICKS P/30	STI014	.35		
*1 BTL.	PHENOTHALEIN 500 ML	PRO38-50	4.50		
2 BTL.	IRON FILINGS 150 G	IRO001	1.65		
*1 PKG.	FLOUR 2 LBS.	FL0008	.90		
DRAWER 2					
*4 BOXES	FOOD COLOR SET/4	COL002	2.50		
2 PKGS.	MEDICINE DROPPERS P/12	DRO002	3.00		
3 PKGS.	MAGNETS P/6	223-1039	3.90		
*1 BOX	EX-LAX TABLETS	TAB901	1.50		
*6 BTL.	IODINE 1 OZ	IOD002	1.60		
3 PKGS.	TUMBLERS P/12	TUM001	2.15		
*2 VIALS	RED LITMUS PAPER 1 V.	8104	.35		
*2 VIALS	BLUE LITMUS PAPER 1 V.	8105	.35		
1 PKG.	MARBLES P/25	SPH011	1.80		
1 PKG.	BUTTONS P/50	BUT001	1.25		
6	BAR MAGNETS PKG/1	MAG902	2.75		
*1 BTL.	BTB	BTB003	1.30		
*1 BTL.	ASPRIN BOTTLE/60	ASP901	1.35		
*1 PKG.	BAGS OF TEA P/4	TEA900	1.00		
*1 PKG.	POWDERED MILK 8OZ	MIL900	.75		

DRAWER 3					
15	HAND LENSES (1)	MAG025	.95		
1 BOX	MICROSCOPE SLIDES P/72	SLI002	5.80		
1 BOX	COVERSLIPS P/100	SLI003	2.00		
1 PKG.	MEDICINE DROPPERS P/12	DRO001	3.20		
15 BKS.	OBIS POND GUIDE (1)	GUI111	2.25		
*1 PKG.	DRY RICE P/1 LB	RIC001	.85		
4 PKGS.	6-LITER CONT. LIDS P/2	201-1061	2.35		
1 BOX	DEPRESSION SLIDES P/40	SLI004	2.60		
*1 PKG.	LENS PAPER P/50	PAP009	.50		
4	6-LITER CONTAINER (1)	205-1023	2.80		
1 SET	PREPARED SLIDES	SLI909			
DRAWER 4					
10	JAR W/LID 1-8 OZ	JAR006	.70		
15	RULER 1-30CM	RUL002	.25		
4	6-LITER CONTAINER	205-1023	2.80		
1 PKG.	SPONGES P/8	SPO010	2.75		
DRAWER 5					
*1 PKG.	LARGE BALLOONS P/30,#8	BAL001	2.20		
2	SPOOL OF THREAD	THR001	1.00		
*1 ROLL	ALUMINUM FOIL 1 /12IN.	FOI006	1.95		
*1 ROLL	PLASTIC WRAP	PLA012	2.20		
2 PKGS.	FLASHLIGHT BULBS P/10	BUL004	3.80		
1	D-CELL COUPON FOR 24	BAT003	9.30		
2 ROLLS	320 COPPER WIRE 100 FT UNINSULATED	WIR008	3.30		
2 PKGS.	BATTERY HOLDERS P/10 W/CLIPS	HOL003	6.50		
2 PKGS.	BULB HOLDERS P/10	SOC002M	5.00		
1 PKG.	THUMBTACKS P/100	THU001	.95		
2 ROLLS	#22 COPPER WIRE 100FT INSULATED	WIR010	3.50		
6	WIRE STRIPPER	CUT001	3.45		
*1 PKG.	INDEX CARDS P/100 6x8"	CAR003M	2.50		
4 PKG.	CIRCUIT PUZZLES P/4	223-1056	.85		
1 PKG.	NAILS P/16 SM. STEEL	225-1037	.65		
1 PKG.	COMPASS P/12	COM001	7.95		
3	ZINC & COPPER FOIL 10x10CM	4645	6.50		
*1 BTL.	VINEGAR 1 QT.	VIN003	2.05		
1 BOX	BRASS FASTENERS P/100	FAS001	2.10		
100	FAHNESTOCK CLIPS (1)	CLI004M	.04		
1 ROLL	ENAMEL COATED WIRE	WIR012	9.50		
1 PKG.	RUBERIZED MAGNETS P/25	MAG008	6.80		
1 PKG.	10 D NAILS P/40	NAI006	1.20		
1 PKG.	20 D NAILS P/40	NAI005	2.30		
1 PKG.	METRIC RULERS P/4 WOOD	202-1049	3.00		

DRAWER 5 CONT.

*1 ROLL	MASKING TAPE 3/4IN.	TAP004	1.70		
1 PKG.	WOOL CLOTH P/6	CLO003	3.75		
6	30 WATT LIGHT BULB	LIG908	1.25		
1	6 VOLT BATTERY	BAT005	6.75		
1 PKG.	STYROFOAM CUPS P/25	CUP012	1.95		
6 SHEETS	SANDPAPER, FINE (1)	8039	.50		
6	ZINC NAIL	NAI903	1.50		
1	TIN SHEET 10"x10"	SHE902	2.50		
1	ELECTRICAL TAPE	TAP901	2.55		

LARGE MASTER SHIPPER

1	ANT FARM	LMX001	18.00		
2	MULTIPURPOSE BALANCE	BAL004	10.25		
10	CRICKET SHELTERS P/4	CH213	.60		

LARGE WHITE INNER

3	30ML PLASTIC MEDICINE CUP P/100	CUP005	2.35		
3 ROLLS	PLASTIC BAGS WITH TWISTEMS P/80	BAG010	1.95		
1 ROLL	WHITE LABELS 1"x3" P/100	LAB009	1.55		
1 PKG.	WOODEN STIR STICKS P/300	STI009	1.05		
4 PKG.	DROPPER BOTTLES 2 OZ P/8	BOT005	3.80		
1 PKG.	PAPER SOUFFLE CUPS P/500	CUP019	6.50		
3	PLASTIC PAILS 5 QT. P/3	PAI003	3.90		
1 PKG.	MAGNIFYING LENS P/10	MAG004	3.40		
1 PKG.	PLASTIC SPOONS P/30	SPO003	.95		

S & S SHIPPER

*1 PKG.	SALT, 3 LB	SOD008	2.40		
*1 PKG.	SUGAR, 5 LB	SUG004	5.40		
*1 PKG.	BAKING SODA, 4 LB	SOD005	5.25		
*1 PKG.	POWDERED STARCH, 4LB	STA005	5.20		
*1 PKG.	PLASTER OF PARIS, 5LB	PLA007	3.95		

* CONSUMABLE MATERIALS CONTAINED IN THE REFILL PACKAGES

CARROLL COUNTY, MARYLAND
SCIENCE LAB KIT GRADE 5
EARTH SCIENCE AND SOIL ANALYSIS

QUANTITY IN KIT	DESCRIPTION / PKG. QUANTITY	ORDER NO.	UNIT PRICE	QUANTITY ORDERED	TOTAL PRICE
DRAWER 1					
2 PKGS.	GALENA P/5	ROC019	2.25		
2 PKGS.	MICA P/5	ROC005	1.10		
2 PKGS.	QUARTZ P/5	ROC029	1.50		
2 PKGS.	HALITE P/5	ROC043	1.95		
2 PKGS.	TALC P/5	ROC034	1.50		
2 PKGS.	HEMATITE P/5	ROC021	1.50		
2 PKGS.	MAGNETITE P/5	ROC024	2.25		
2 PKGS.	CALCITE P/5	ROC016	1.50		
2 PKGS.	PYRITE P/5	ROC044	1.65		
2 PKGS.	GRAPHITE P/5	ROC020	1.50		
2 PKGS.	PINK FELDSPAR P/5	ROC017	1.50		
2 PKGS.	MICA, BIOTITE P/5	ROC015	1.50		
2 PKGS.	WHITE FELDSPAR P/5	ROC018	1.50		
2 PKGS.	QUARTZ, SMOKY P/5	ROC907	2.50		
2 PKGS.	BLACK HEMATITE P/5	ROC908	2.50		
2 PKGS.	GARNET, ALMANDINE P/5	ROC909	2.50		
2 PKGS.	GARNET, ANDRADITE P/5	ROC910	2.50		
2 PKGS.	BLACK MAGNETITE P/5	ROC911	2.50		
DRAWER 2					
3	TROWEL (SHOVELS)	SHO002	2.10		
3 PKGS.	TONGUE DEPRESSORS P/10	STI020	.80		
2 PKGS.	FEATHERS ASSORTED	FEA003	3.00		
*1 CAN	PAM, VEG. SPRAY	VEG900	1.95		
5 PKG.	FOSSILS (5 KINDS)	ROC912	1.05		
2	GREASE PENCILS 1/BLACK	PEN001	.60		
DRAWER 3					
*1 BOX	STRAWS P/40	STR001	.75		
3	LG. PLASTIC TRASH BAGS	BAG901	1.25		
4 LBS.	LIMESTONE CHIPS 1 LB.	LIM003	1.80		
DRAWER 4					
1 BOX	MICROSCOPE SLIDES	SLI002	5.80		
1 BOX	COVER SLIPS	SLI003	2.00		
*1 QT.	VINEGAR	VIN003	2.05		
*1 ROLL	MASKING TAPE 3/4IN.	TAP004	1.55		
1 PKG.	STREAK PLATES P/15	PLA015	2.00		
1 PKG.	MAGNETS P/10	MAG013	7.40		
1 PKG.	EYE DROPPERS P/12	DRO002	3.00		
1 PKG.	VIALS W/CAPS P/10	VIA013	2.70		

10	HAND LENSES	MAG025	.95		
10	BATTERIES	BAT001	.40		
1 PKG.	WIRE, 10" LONG P/20	WIR016	1.60		
1 PKG.	BULBS P/10	BUL001	3.05		
*4 PKG.	ALUM 200 GMS.	8379	1.95		
30	RULERS	RUL002	.25		
1 PKG.	PAPER PLATES P/35	PLA006	1.80		
1 PKG.	PAILS P/3	PAI003	3.90		
1 PKG.	BULB SOCKETS P/10	SOC002M	5.00		
DRAWER 5					
*1 BLT.	FOOD COLOR, RED 2 OZ.	COL003	1.10		
4	CONTAINER, 6 LITER	205-1023	2.80		
1	DIP NET P/3	NET006	2.70		
4 PKGS.	CLEAR PLASTIC CUPS P/12	TUM001	2.15		
DRAWER 6					
*2 PKGS.	LIME, 30ML	5254	1.30		
*3 VIALS	BLUE LITMUS PAPER	8105	.35		
*3 VIALS	RED LITMUS PAPER	8104	.35		
*3 PKGS.	PLANT FOOD, 8 OZ	FER901	2.15		
*2 PKGS.	RADISH SEEDS	SEE029	.60		
*3 PKGS.	LIMA BEAN SEEDS 1/2 LB	SEE024	2.50		
*20	LUNCH BAG	8091	.05		
*1 LB.	GRASS SEED	SEE903	2.50		
*1	SOIL TEST KIT	SOI906	25.17		
TERRARIA BOX					
4	CONTAINERS 6-LITER	205-1023	2.80		
SAND AND SOIL BOX					
*1 PKG.	SOIL, 8 QTS.	SOI003	2.20		
*3 LBS.	PEBBLES, 1 LB.	ROC036	.95		
*1 PKG.	GRAVEL, 5 LB.	GRA004	2.50		
*3 PKGS.	HUMUS, 500 G	SOI011	1.95		
*1 PKG.	SAND, 5 LBS.	SAN003	1.90		
*2 PKGS.	PLASTER OF PARIS, 5/LB	PLA007	3.95		
*3 PKGS.	CLAY SOIL, 5 LBS.	SOI009	2.90		
*1 PKG.	FINE GRAVEL, 5 LBS.	GRA901	1.75		

* CONSUMABLE MATERIALS CONTAINED IN REFILL PACKAGES

APPENDIX G: SUPPLEMENTAL TEXTS

Pulley Learning Associates

P. O. Box 4117
Greenville, S. C. 29608
Phone: (803) 271-8694

November 6, 1984

Mr. Gary E. Dunkleberger, Science Supervisor
Carroll County Public Schools
55 North Court Street
Westminster MD 21157

Dear Mr. Dunkleberger:

Enclosed are lists of books which we have mailed for your examination. I hope that your teachers will find it helpful to look at the books before actually purchasing them.

When you have finished with them, please return by book post.

Sincerely yours,

E. R. Pulley

Elizabeth R. Pulley

LEVEL ONE - SCIENCE

RELATED READINGS

TITLE	AUTHOR	ANNOTATION	PRICE
JIG AND LITTLE	MUMFORD, JILL	PICTURES ILLUSTRATING CONCEPT OF OPPOSITES.	6.9
CORN IS MAIZE	ALIKI	GIFT OF THE INDIANS. HISTORY AND CULTURE OF CORN.	10.9
DANDELION, THE (LIFE CYCLE)	HOGAN, PAULA	LARGE PICTURES & SIMPLE TEXT LEAD FROM SEED TO FLOWER.	10.7
DOWN COME THE LEAVES	BANCROFT, HENRIETTA	WHY LEAVES TURN COLOR & FALL; OUTLINES OF SOME LEAVES.	10.8
FAST AND SLOW	NORTH	CONCEPT OF "OPPOSITES" IN SIMPLE PICTURES	6.9
FIND OUT BY TOUCHING	SHOWERS, P	EXPLORES THE RANGE OF INFORMATION GATHERED BY TOUCH.	10.8
FOSSILS TELL OF LONG AGO	ALIKI	HOW FOSSILS ARE FORMED & HOW TO MAKE YOUR OWN.	10.8
FRONT AND BACK	CORBETT	PICTURES ILLUSTRATE CONCEPT OF OPPOSITES.	6.9
LOOK AT ANNETTE	WALTER, MARION	MIRROR INCLUDED TO MAKE DIFFERENT IMAGES FROM DRAWINGS.	6.9
LOOK AT MAGNETS	KIRKPATRICK, R	COLORFUL PICTURES OF TYPES & USE OF MAGNETS. SUMMARY	10.7
MAKE A BIGGER PUDDLE, MAKE A.	WALTER, MARION	USE MIRROR IN BOOK TO SEE DIFFERENT PICTURES.	4.9
MY FAVORITE THINGS	NATHAN, STELLA	BIG PICTURES, REBUS STORIES, & PICTURE GLOSSARY.	3.0
MY HANDS	ALIKI	NAMES & USES OF FINGERS; WHAT WE DO WITH OUR HANDS	10.8
NOISY AND QUIET	CALAORA	ONLY THE 2 WORDS WITH PICTURETO ILLUSTRATE THE OPPOSITES.	6.9
OLD AND NEW	MOUSDALE	CONCEPT OF OPPOSITES ILLUSTRATED IN BRIGHT COLORS.	6.9
RAIN	RICKETTS	SINGLE CONCEPT, ONE-LINE SENTENCES.	4.9
SEEDS AND MORE SEEDS	SELSAM, MILLICENT	EASY READER ABOUT GROWTH & SCATTERING OF SEEDS	7.9
SEEDS BY WIND AND WATER	JORDAN, HELENE J	ADAPTATIONS FOR DISPERSION WHICH HAVE BEEN DEVELOPED.	10.8
SHADOWS,HERE,THERE,&EVERYWHER	GOOR, RON & NANCY	STRIKING B&W PHOTOS WITH BRIEF TEXT.	9.8
THINGS IN MY HOUSE	NATHAN, STELLA	BIG PICTURES, REBUS STORIES, AND PICTURE GLOSSARY	3.0
THINGS THAT GO!	NATHAN, STELLA	PICTURES, REBUS STORIES, AND PICTURE GLOSSARY	3.00
TOP AND BOTTOM	ROUND	PICTURES ILLUSTRATE CONCEPT OF OPPOSITES	6.9

GRAND TOTALS $ 172.23

PULLEY LEARNING ASSOCIATES. BOX 4117, GREENVILLE, SC 29608 TEL: 803 271-8694

11-01-84

LEVEL TWO - SCIENCE

RELATED READINGS

TITLE	AUTHOR	ANNOTATION	PRICE
ANTS	FERGUSON	24 PAGE. SINGLE CONCEPT, SIMPLE FACTS & PICTURES	4.9
BOATS	LACHMAN, RUTH	COLORFUL PICTURES OF VARIOUS KINDS OF BOATS. SIMPLE TEXT	3.5
BUTTERFLIES	MOUSDALE		4.9
BUTTERFLY CYCLE, THE	OXFORD SCIENTIFIC	FULL-PAGE PHOTOGRAPHS WITH EXPLANATION OF LIFE CYCLE.	8.9
BUTTERFLY, THE (LIFE CYCLE)	HOGAN, PAULA	STEP-BY-STEP FROM EGG TO CATERPILLAR TO BUTTERFLY.	10.7
CLOCKS AND HOW THEY GO	GIBBONS, GAIL	WEIGHT & SPRING CLOCK & HOW THEY WORK.	9.8
FLOATING AND SINKING	BRANLEY, FRANKLIN	BASIC FACTS ABOUT BUOYANCY OF WATER AND ITS PROPERTIES.	10.8
HONEYBEE, THE (LIFE CYCLE)	HOGAN, PAULA	IN SIMPLE TERMS AND LARGE ILLUSTRATIONS.	10.7
ICEBERGS	GANS, ROMA	ORIGIN, DISTRIBUTION, AND MENACE OF ICEBERGS	10.8
INSECTS THAT LIVE IN FAMILIES	MORRIS	DESCRIBES HABITS OF ANTS, BEES, & OTHER SOCIAL INSECTS.	10.7
LOOK AT INSECTS	KIRKPATRICK, R.	DESCRIBES HABITS, LIFE CYCLES & FOOD. SUMMARY & INDEX	10.7
SALT	GOLDIN	EXPLANATION OF CHEMICAL SODIUM CHLORIDE AND EXPERIMENTS	10.89
SHELLS ARE SKELETONS	VICTOR, JOAN	HOW CREATURES LIVE, MOVE, & EAT INSIDE SHELLS.	10.89
SNOW IS FALLING	BRANLEY, FRANKLYN	WHAT MAKES SNOW; WHAT FLAKES ARE LIKE. EFFECT ON LIFE.	10.89
SPRING PEEPERS	HAWES, JUDY	HABITS, HABITAT & HOW THEY PRODUCE THEIR SPRING CALL.	10.89
TERRY AND THE CATERPILLARS	SELSAM, MILLICENT	EASY READING STORY OF LIFE CYCLE OF CECROPIA MOTH.	7.95
TIME AND CLOCKS (RAS)	BREITER, HERTA	DESCRIBES PLANT, ANIMAL, AND HUMAN TIMEKEEPING.	10.75
GRAND TOTALS			$ 159.28

PULLEY LEARNING ASSOCIATES, BOX 4117, GREENVILLE, SC 29608 TEL: 80[illegible] 71-8694

11-01-84

LEVEL THREE - SCIENCE

RELATED READINGS

TITLE	AUTHOR	ANNOTATION	PRICE
AIRPLANES AND BALLOONS (RAS)	KANETZKE, HOWARD	HISTORY OF LIGHTER-THAN-AIR CRAFT. COLORFUL ILLUSTRATIONS	10.75
AMAZING EARTHWORM, THE	HESS, LILO	ALL ABOUT THE EARTHWORM. ITS CHARACTERISTICS & BENEFITS.	9.95
ANIMALS THAT BURROW	MORRIS	MOLES, EARTHWORMS, SQUIRRELS,SPIDERS, SNAKES, ARMADILLOS..	10.75
BIRDS (RAA)	MORRIS	EMPHASIS ON FOOD-GATHERING, MIGRATION & NEST-BUILDING.	10.75
CLEAN BROOK, THE	BARTLETT, MARG.	NATURE'S FILTERS WHICH HELP TO CLEAN THE WOODLAND BROOK	10.89
DESERTS (RAS)	MORDEN, CARROLL	DESERT HABITAT:PLANT, ANIMAL AND HUMAN LIFE.	10.75
FARM MACHINES	WYKEHAM, NICHOLAS	TRACTORS, COMBINES, HARROWS,&HARVESTERS. COLOR PICTURES.	10.75
FLYING MACHINES	GIRARD, PAT	HELICOPTERS, BALLOONS,AIRSHIPSAILPLANES IN COLOR PHOTOS.	10.75
JET JOURNEY	WILSON, MIKE	DESIGN OF AIRCRAFT. FLIGHT PRINCIPLES, CONCORDE MODEL.	8.95
LOOK AT SEEDS AND WEEDS	KIRKPATRICK, R	COLORFUL ILLUSTRATIONS, INDEX & SUMMARY.	10.75
LOOK AT TREES	KIRKPATRICK	COLORFUL LABELLED PICTURES OFLIFE CYCLE & DIFFERENT TREES.	10.75
LOTS OF ROT	[illegible]S, VICKI	WHAT CAUSES ROT,WHERE TO FIND IT.HOW TO GROW IT.	10.89
[illegible]OOMS AND MOLDS	FRONAN	DESCRIBES TYPES, LOCATION & SIMPLE EXPERIMENTS.	10.89
PUMPKIN PEOPLE, THE	CAVAGNARO, DAVID	FROM PUMPKIN SEED TO JACK-O- LANTERN. LIFE CYCLE THEME.	9.95
ROOTS ARE FOOD FINDERS	BRANLEY, FRANKLYN	MINERAL- AND WATER-ABSORBING PROPERTIES OF ROOTS.	10.89
STATISTICS	SRIVASTAVA, JANE J	HOW TO ASSEMBLE AND CLASSIFY NUMERICAL FACTS.	10.89
STRAIGHT,PARALLEL,PERPEN LINE	CHAROSH, MANNES	USING STRING, CHECKER SET, PENCIL & PAPER ACTIVITIES.	10.89
TWIST, WIGGLE & SQUIRM....	PRINGLE, LAURENCE	A BOOK ABOUT EARTHWORMS	10.89
WHERE DOES YOUR GARDEN GROW?	GOLDIN	BASIC INFORMATION ABOUT HORTICULTURE	10.89
WORLD BENEATH OUR FEET,THE	KEEN, MARTIN	THE STORY OF SOIL:COMPOSITION,IMPORTANCE & CONSERVATION	7.64
ZERO IS NOT NOTHING	SITOMER, MINDEL	FUNCTION OF THE NUMERAL ZERO: PLACE-HOLDER,STARTING POINT.	10.89

GRAND TOTALS $ 220.50

[illegible]LLEY LEARNING ASSOCIATES, BOX 4117, GREENVILLE, SC 29608 TEL: 803 271-8494

RELATED READINGS

TITLE	AUTHOR	ANNOTATION	PRICE
ABC OF ECOLOGY	KILLGROM, HENRY	PICTURES & TEXT DEMONSTRATE ECOLOGY..FOR LETTERS OF ALPHA	8.
BIOLOGICAL CLOCKS	RIEDMAN, SARAH	ALL LIVING THINGS FUNCTION IN A PATTERN FROM INNER CLOCKS.	10.
CARE OF WATER PETS, THE	PELS, GERTRUDE	SELECTION & CARE OF AQUARIUM ANIMALS (FISH, SNAILS, ETC.)	10.
CARS: A LOOK INSIDE	CLARK, JAMES	VIEW OF BRAKING, ELECTRICAL, & TRANSMISSION OF CARS	11.
CHAINS, WEBS AND PYRAMIDS	PRINGLE, LAURENCE	THE FLOW OF ENERGY IN NATURE.HOW GREEN PLANTS CONVERT SUN.	10.
COMMUNICATIONS MACHINES	HOWARD, SAM	COLOR PHOTOS OF SATELLITES, RADAR SCOPES, ETC. GLOSSARY	10.
CRICKET IN THE GRASS	VAN SOELEN, PHILIP	LIFE & DEATH IN A WATERSHED WITH 5 FOOD CHAINS & ENVIRONS	10.
FIRE (RAS)	DAUB, EDWARD	OUTLINES MAN'S USES OF FIRE FROM CAVEMAN TO JET PLANES.	10.
FROG, THE (LIFE CYCLE)	HOGAN, PAULA	COLORFUL PICTURES & SIMPLE TEXT LEAD FROM EGG TO FROG.	10.
FROGS AND TOADS (READ ABOUT)	MORRIS	HABITS & HABITAT, SIMILARITIES & DIFFERENCES.	10.
FUZZ DOES IT!	COBB, VICKI	FIBERS IN FUZZ—WHERE THEY COME FROM & HOW THEY ARE MADE	10.
INTERNAL COMBUSTION ENGINE,TH	OLNEY, ROSS	SIMPLE ANALOGIES EXPLAIN HOW AUTOMOBILE ENGINE WORKS.	9.
JUNGLE, THE (RAS)	NORDEN, CARROLL	DESCRIBES PLANT, ANIMAL, AND HUMAN LIFE IN JUNGLE HABITAT	10.
LOOK AT POND LIFE	KIRKPATRICK, R	COLORFUL PICTURES OF PLANTS &ANIMALS AROUND A POND.	10.
MESSAGES WITHOUT WORDS	WOOD, BARBARA	SYMBOLS AND SIGNALS: BELLS, SMOKE, FLAGS, FACIAL EXPRESS.	10.
MONKEYS AND APES	MORRIS	CHARACTERISTICS, HABITS, & HABITATS OF SOME VARIETIES.	10.
MOTORS AND ENGINES, HOW WORK	WEISS	PRINCIPLES OF ELECTRIC, WIND,SPRING, STEAM, GAS & JET.	11.
PRAIRIE DOGS IN PRAIRIE TOWN	EBERLE	HABITS, FOOD, & ENVIRONMENT.	9.
ROBOTS: A LOOK INSIDE	KLEINER, ART	HOW A ROBOT OPERATES: THEIR USE AND FUTURE.	11.
SCIENCE IN A VACANT LOT	SIMON, SEYMOUR	INSECTS, BIRDS, ROCKS, TREES, & OTHER FINDS NEARBY	7.
SPIDERS (RAA)	MORRIS	ILLUSTRATES TYPES AND CHARACTERISTICS OF SPIDERS.	10.
TELEVISION MAGIC	JONES, E.G.	EXPLAINS THE PRODUCTION OF A TELEVISION PROGRAM	8.
TRAINS AND RAILROADS (RAS)	KANETZKE, HOWARD	DESCRIBES DEVELOPMENT FROM EARLY TRAINS TO MONORAILS.	10.
UNDERWATER LIFE	MORRIS	PLANT AND ANIMAL LIFE UNDER THE SEA	10.
VIEW FROM THE OAK, THE	KOHL, JUDITH	WINNER OF 1978 NATIONAL BOOK AWARD. INTROD. TO ETHOLOGY.	13.
YES-NO; STOP-GO	GERSTING, JUDITH	PATTERNS IN MATHEMATICAL LOGIC, SWITCHING PROBLEMS.	10.

GRAND-TOTALS $ 273

PULLEY LEARNING ASSOCIATES, BOX 4117, GREENVILLE, SC 29608 TEL: 803 271-8694

LEVEL FIVE - SCIENCE

RELATED READINGS

TITLE	AUTHOR	ANNOTATION	PRIC
CLEAN AIR-CLEAN WATER	MILLARD, REED	CAUSES AND PRICE OF AIR AND WATER POLLUTION.	8
COLLECTING SMALL FOSSILS	HUSSEY, LOIS J	STEP-BY-STEP INSTRUCTIONS FOR FOSSIL HUNTING NEARBY.	7
EARTH MOVING MACHINES	STONE	BULLDOZERS, STEAM SHOVELS AREPICTURED AND DESCRIBED.	10
EARTHQUAKE!	MIKLOWITZ, GLORIA	COMPARES EARTH TO AN EGG AND EXPLAINS WHAT HAPPENS.	8
END OF THE WORLD, THE	BRANLEY	DISCUSSES INEVITABLE CHANGE IN EARTH'S CONDITION IN SPACE	10
GLACIERS	TANGBORN	WHAT GLACIERS ARE, HOW & WHY THEY MOVE; EFFECTS ON EARTH.	10
GOING, GOING, GONE?	MARSHALL, JAMES	THE WASTE OF OUR ENERGY RESOURCES.	7.
OIL MACHINES	PICK, CHRISTOPHER	DERRICKS, OFFSHORE RIGS, TRUCKS, REFINERIES IN COLOR PHOTO	10.
SECRET CLOCKS, THE	SIMON, SEYMOUR	TIME SENSES OF LIVING THINGS:ANIMALS,PLANTS & PEOPLE.	9.
SHAKES, QUAKES, AND SHIFTS	BRANLEY	EARTH TECTONICS; CONTINENT DRIFT SIMPLY EXPLAINED.	10.
SPACE (RAS)	SEEVERS, JAMES	SOLAR SYSTEM, SPACECRAFT, ANDASTRONAUTS.GLOSSARY, INDEX.	10.
UNDERSEA MACHINES	PICK, CHRISTOPHER	SUBMARINES, SEA LABORATORIES,HABITATS, DIVING SUITS.	10.
WEATHER (READ ABOUT)	BREITER	CLEAR PICTURES, DIAGRAMS,& LABELS FOR WEATHER PATTERNS.	10.

GRAND TOTALS $ 128.5

APPENDIX H:
LIVE MATERIALS CENTER

LIVE MATERIALS ORDER FORM

SEND TO: Westminster High School
Living Materials Culture Center
ATTENTION: Doug Yust

Date _____

FROM: Teacher _____ School _____

School Phone _____ Date Needed _____

1. To request materials send this form by inner office mail to Westminster High School at least two (2) weeks prior to the date needed.

2. Orders will be delivered by the pony on the regular delivery route. Where this conflicts with the requested date we will attemot to deliver the day before the one you gave.

ORGANISM	QUANTITY AVAILABLE	DATE REQUESTED
PROTOZOA		
AMOEBA†	CS ☐	
EUGLENA†	CS ☐	
PARAMECIUM†	CS ☐	
MIXED PROTOZOA†	CS ☐	
PARAMECIUM, MEDIUM	☐	
EUGLENA, MEDIUM	☐	
AMOEBA, MEDIUM	☐	
ALGAE		
VOLVOX†	CS ☐	
CHLAMYDOMONAS†	CS ☐	
ANABAENA†	CS ☐	
MIXED ALGAE†	CS ☐	
SPIROGYRA†	CS ☐	
ALGAE, MEDIUM	☐	
SPIROGYRA, MEDIUM 500 ML	☐	
FUNGI		
SLIME MOLD†	CS ☐	
PLANTS		
DUCKWEED†	CS ☐	
ELODEA	EA ☐	

ORGANISM	QUANTITY AVAILABLE	DATE REQUESTED
SMALL ANIMALS		
CRAYFISH	EA ☐	
CRICKETS	12 ☐ 25 ☐	
EARTHWORMS	EA ☐	
FRUIT FLIES - APTEROUS	EA ☐	
FRUIT FLIES - WILD	EA ☐	
FRUIT FLIES-WH. EYED-SEX LINKED	EA ☐	
FIFTH GRADE FRUIT FLY KIT	EA ☐	
GOLDFISH*	EA ☐	
GUPPIES-TRIO	☐	
FROGS*	EA ☐	
ISOPODS	25 ☐ 50 ☐	
MEALWORMS	25 ☐ 50 ☐	
SECOND GRADE MEALWORM KIT	EA ☐	
PLANARIA††	CS ☐	
POND SNAILS	6 ☐ 12 ☐	
HERMIT CRABS	EA ☐	
CHAMELEON	EA ☐	
DAPHNIA†	CS ☐	
ANTS†	CS ☐	
VINEGAR EELS†	CS ☐	

☐ CONFIRMATION DESIRED

†CLASS SET QUANTITIES SUFFICIENT FOR 30 STUDENTS
*FOR OBSERVATIONAL PURPOSES ONLY

APPENDIX I:
SUMMER SCIENCE FUN

SUMMER SCIENCE FUN

GRADE 2

CARROLL COUNTY PUBLIC SCHOOLS
55 North Court Street
WESTMINSTER, MARYLAND 21157

C A R R O L L C O U N T Y P U B L I C S C H O O L S

WESTMINSTER, MARYLAND

DR. OLIN L. ADAMS, JR.
Superintendent

Dr. Robert E. Kersey
Assistant Superintendent
in Instruction

Mr. R. Edward Shilling
Assistant Superintendent
of Schools

BOARD OF EDUCATION

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Mr. John D. Myers, Jr.

County Commissioners
Ex Officio

Mr. A. N. Scott Samios
Student Representative

CURRICULUM WRITING TEAM:

GRADE 1

MARY KATASAFANAS
Eldersburg Elementary

ANGELA NUNNELLY
Winfield Elementary

LINDA WITTER
William Winchester

Grade 2

BETTIE BOHR
William Winchester

ROSA FEATHERSTONE
Freedom Elementary

CHRISTINE VINCENT
Westminster Elementary

Grade 3

MARTY DEVILBISS
William Winchester

DIANE HUGHES
Eldersburg Elementary

GERALDINE KECK
Mechanicsville Elementary

GRADE 4

JEAN HEATHERINGTON
Eldersburg Elementary

KIM MACLEAN/BLEVINS
Winfield Elementary

CAROLYN WATERS
Mechanicsville Elementary

GRADE 5

PAMELA ALEXANDER
Eldersburg Elementary

PATRICIA MINNICH
William Winchester

MELISSA WAGNER
Sandymount Elementary

ANN BENBOW
University of Maryland

SUSAN SNYDER
Maryland State Department
of Education

RICHARD L. HANSON
Elementary Supervisor

GARY E. DUNKLEBERGER
Supervisor of Science

Spring, 1985

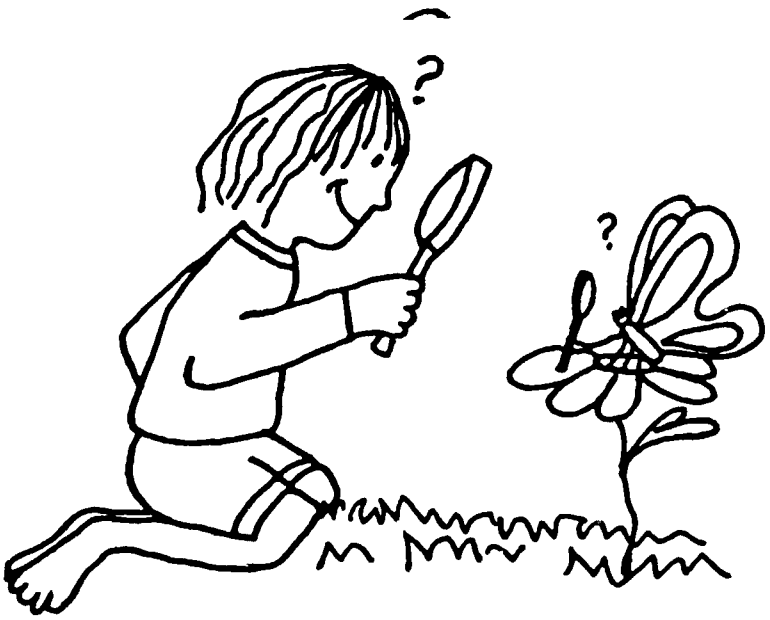
A Message From The Superintendent

The enclosed materials represent a package of science activities and materials for students to work on over the summer. This has two primary purposes. First, by giving continued practice, it reinforces what students learned during the school year just ending. Secondly, this package of materials also includes enrichment activities which go beyond the information previously learned by youngsters.

Your child will need some direction and support from you if this program is to succeed. While most of these activities may be done on an independent basis, some may require parental assistance. This should be a wonderful opportunity to share "hands on" science in the home. It should also give you as a parent some insight into what your child has experienced in science this year when second graders studied Insects, Measuring and Sink or Float.

Students who voluntarily complete these activities will receive a certificate recognizing their efforts. Parents should fill in the last sheet of this booklet as students complete the activities. That sheet along with the rest of the materials should be returned to next year's science teacher.

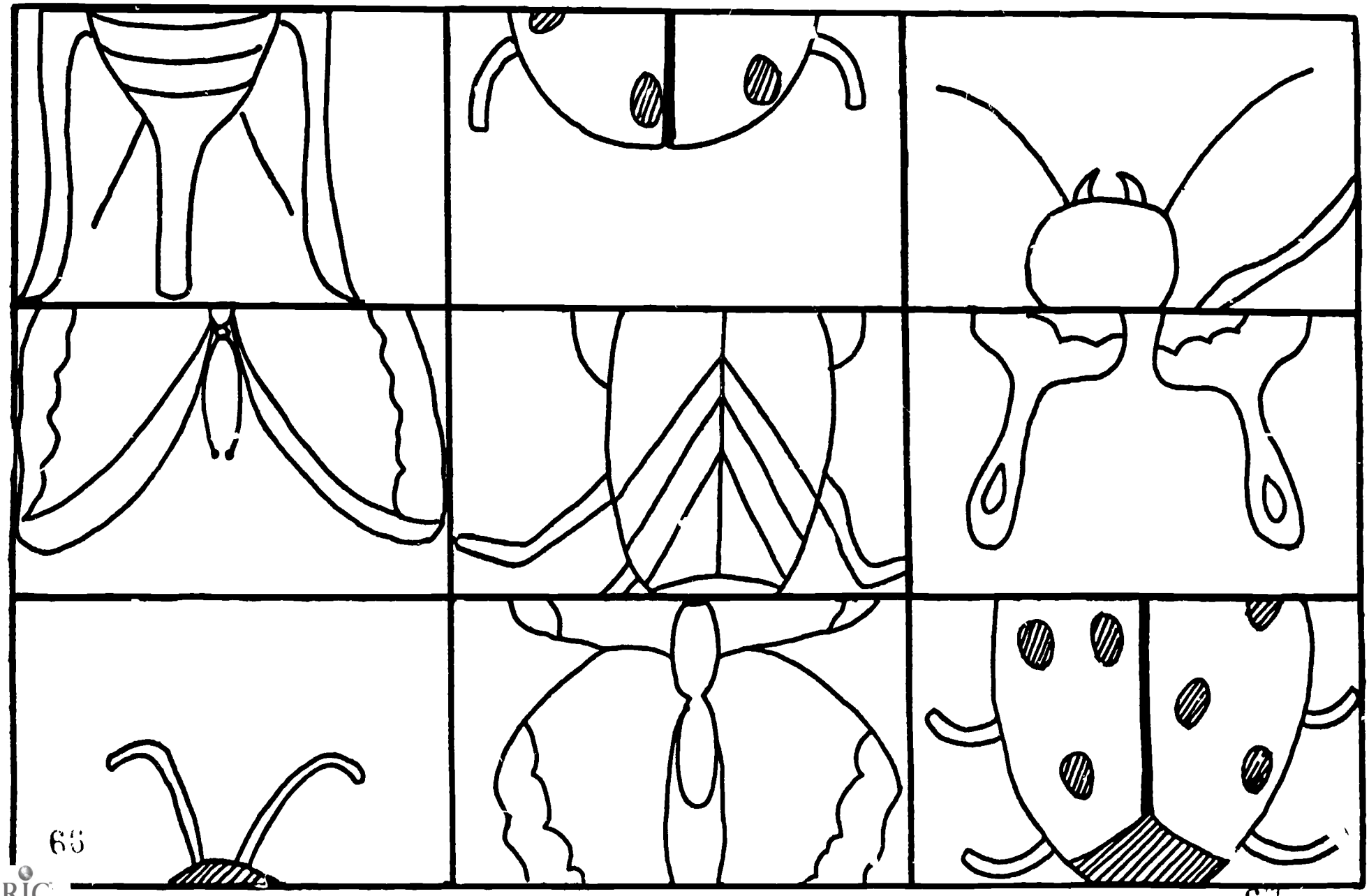
Olin L. Adams, Jr.
Superintendent of Schools



INSECTS

INSECT PUZZLES

DIRECTIONS: Cut out the boxes below. On another piece of paper, piece them together to make three insects of three boxes each. Paste on the paper and color how the insects should appear.



Direction: Cut out the puzzle pieces & paste together on another piece of paper. See what you find.

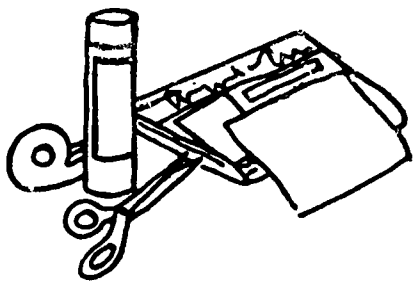
W E B C O L L E C T I N G

COLLECTING:

You can collect and study spider webs with very simple tools. Summer is the best season for finding webs. Some webs can be made in an hour, some take much longer so take care not to collect too many too often.

Use a non-fluorocarbon spray paint. Check the contents. Rustoleum is a good choice.

1. You need some spray paint, contrasting sheets of paper, scissors, tape and newspapers.



2. First make sure the spider is safely out of the way. Cover the web with the paint spray.

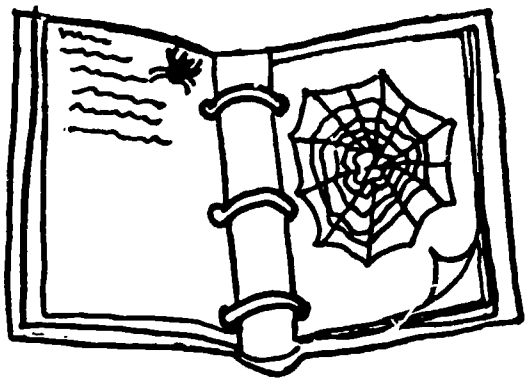
3. While the web is still damp, press a sheet of paper against the web. Cut the lines. Take some notes while it dries.

WEB JOURNAL

You can keep notes in a ring binder. Careful notes will be helpful . identifying the web. Your library is sure to have a book on spiders.

Punch holes

Information about time, place, what the spider looked like

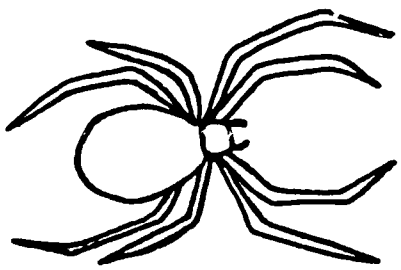


web page

tissue or wax paper

web page

SPIDER ANATOMY



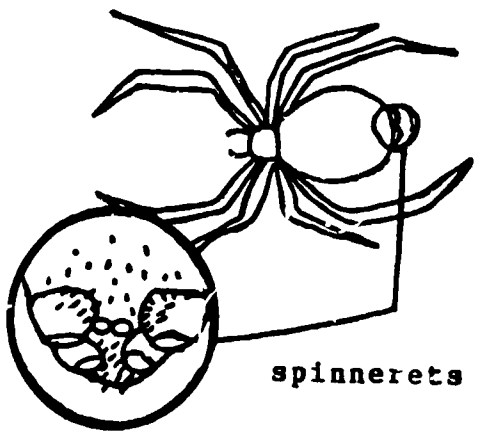
Spiders, like insects have hard shell-like bodies. Unlike insects, they have two body sections, and eight legs. They can have up to eight eyes. Their body hairs are sometimes sensors, or grippers.

They come in a wide range of sizes and shapes. They can be equipped for life underground, in trees, grass or water. Only aerial spiders make web traps for a living. There are many kinds of hunting spiders that rely on speed and skill.

SPIDER SILK

Spiders spin silk from glands in their bodies called spinnerets. The liquid silk hardens into strands as it passes through these finger-like glands.

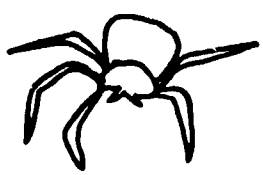
Strands can be as thin as 1/1,000,000 inch, or up to 20 times as thick. They can be made dry or sticky, or even beaded. Silk has greater tensile strength than steel.



SORTS OF SPIDERS

Spiders use silk for their eggs, lining nests, binding up prey, as well as weaving snares for unlucky insects. Many secrete a dragline that constantly acts as a safety rope when they run, jump, or leap.

The bolas spider ropes meals with a web lasso that has a drop of sticky fluid.



Young spiders parachute on the wind with a long web. Threads catch the wind, sending them skyward to new territory.

STAGES OF THE DEVELOPMENT OF THE MOSQUITO

Directions:

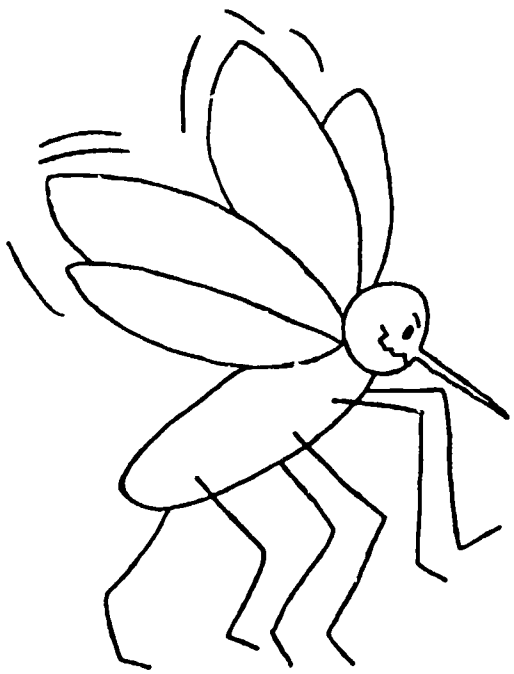
Take a very large mouthed jar and put a piece of lettuce in it. The lettuce should be crushed first so that it is bruised. Put some water in the jar so that it is nearly full. Place it outside to give mosquitoes a place to lay their eggs. This will look like a dark raft floating on the surface. Once eggs are present, place a lid on the jar. Slowly turn your jar first on its side then upside down. This will prevent the adult mosquitoes from escaping once they hatch. Look for the stages of development. Draw and label each stage on the attached paper. The stages to be observed are:

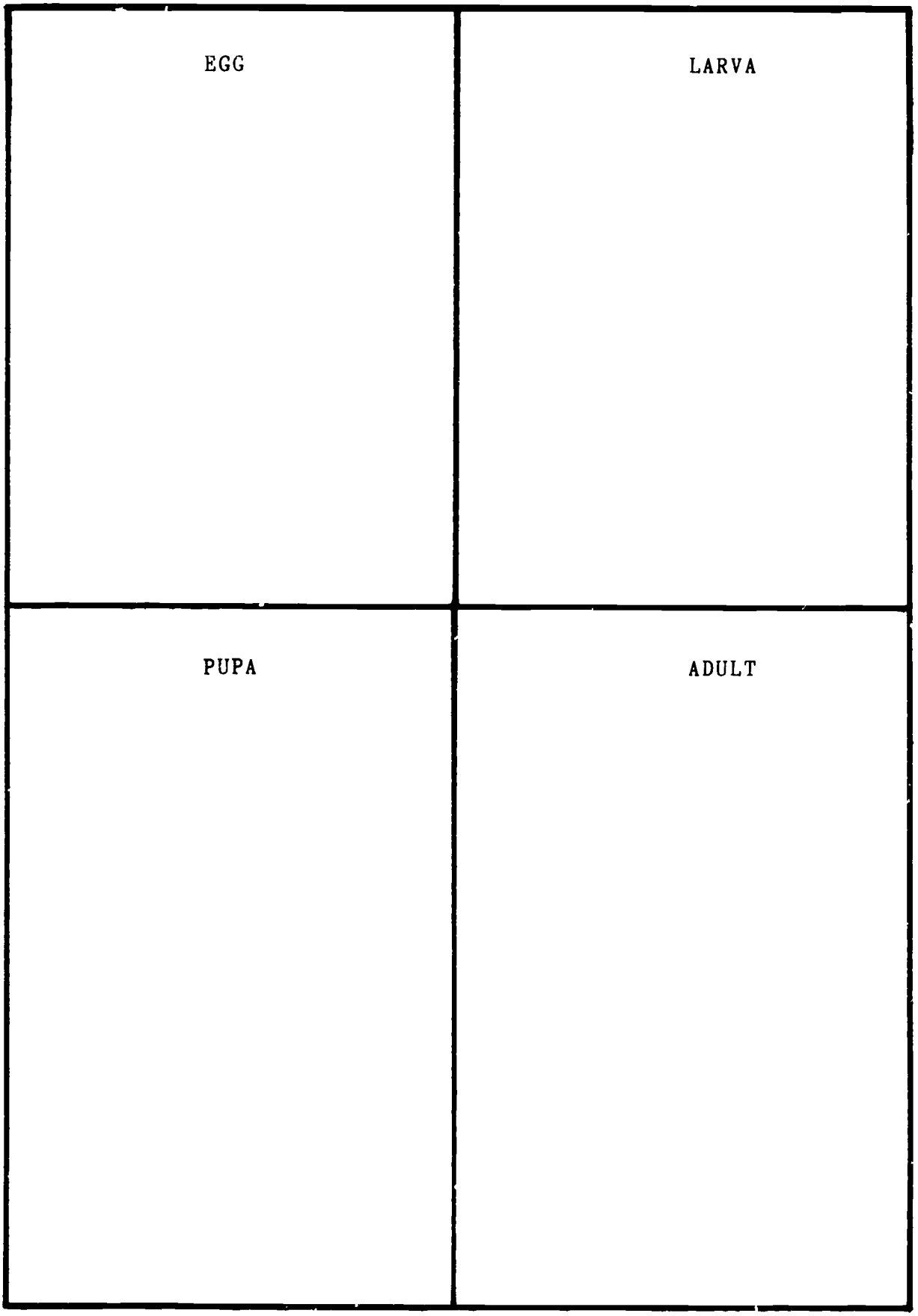
egg - The raft consists of a cluster of eggs laid by the female mosquito.

larva - Sometimes called a "wriggler", the larva is the rapidly moving stage which hatches from the egg.

pupa - The pupa remains nearly motionless except when disturbed and can be recognized by a large "head" which hangs near the water surface.

adult - The grown insect stage with wings is the adult.




EGG
LARVA
PUPA
ADULT

A N T W A T C H I N G

Find an ant's nest. Observe it, making careful note of what the ants do and how they behave. Answer the following questions based upon your observations.

1. An ant has six legs and three body parts. Count them.

2. From what part of the body do the legs grow? _____

3. What is the ant doing? _____

_____

4. Where does it live? _____

_____

5. Do you see ants nearby? _____

_____

There are red ants and black ants. The six legs of the ant grow out of the middle of its three body parts. Ants are busy animals. They seem to have work to do all the time. Ants live in many kinds of places. They live in the ground, in trees, under wood used for buildings, and under stones and sidewalks. Ants live in colonies or groups. They live and work together sharing their food and work.

Things to do:

1. Make a rain storm on the ant hill by dripping water from your fingers. What do the ants do to protect the ant hill? _____

_____

2. Stick a twig into the entrance. What do the ants do?

_____

_____

3. Put different types of food (jam, bread, sugar) near the ant hill. Show an ant where the food is located. Which foods do the ants seem to prefer? What do they do with the food? _____

_____

4. To follow up the activity above, if the ants make a trail from the food to the ant hill--try this. Change the trail in several ways (rub your finger across it to lose the scent, put a stick across the trail. How do the ants react to each of these changes?_____

_____

5. Take a straw and blow a "windstorm" at the entrance of the ant hill. What do the ants do?_____

_____

_____

6. Try to find out how far away an ant will travel from the ant hill. Take an ant and put it about 3 feet from the ant hill. If it gets back alright, try a longer distance until the ant can't find its way back. How far away could you take the ant? _____

_____

A N T F A R M

Obtain two jars of different sizes so that one fits easily into the other. The space between the two should be as small as possible so that the tunnels made by the ants can be easily seen. Turn the smaller jar upside down and place it inside the larger jar. Fill the large jar and the space between the two jars with moist sand. Cover the jar and put tiny holes in the lid.

Materials needed to make a permanent ant farm:

2 pieces of glass
4 strips of wood cut to fit glass

Glue the wooden strips to the edges of glass so that they are about a quarter inch apart. Leave a small opening in the top piece of the frame so that ants, sand, and food can be put in. Use caulking around the edges for a better hold and to make sure there are no holes through which the ants may get out.

H O M E S F O R I N S E C T S A N D A N I M A L S

Materials to use:

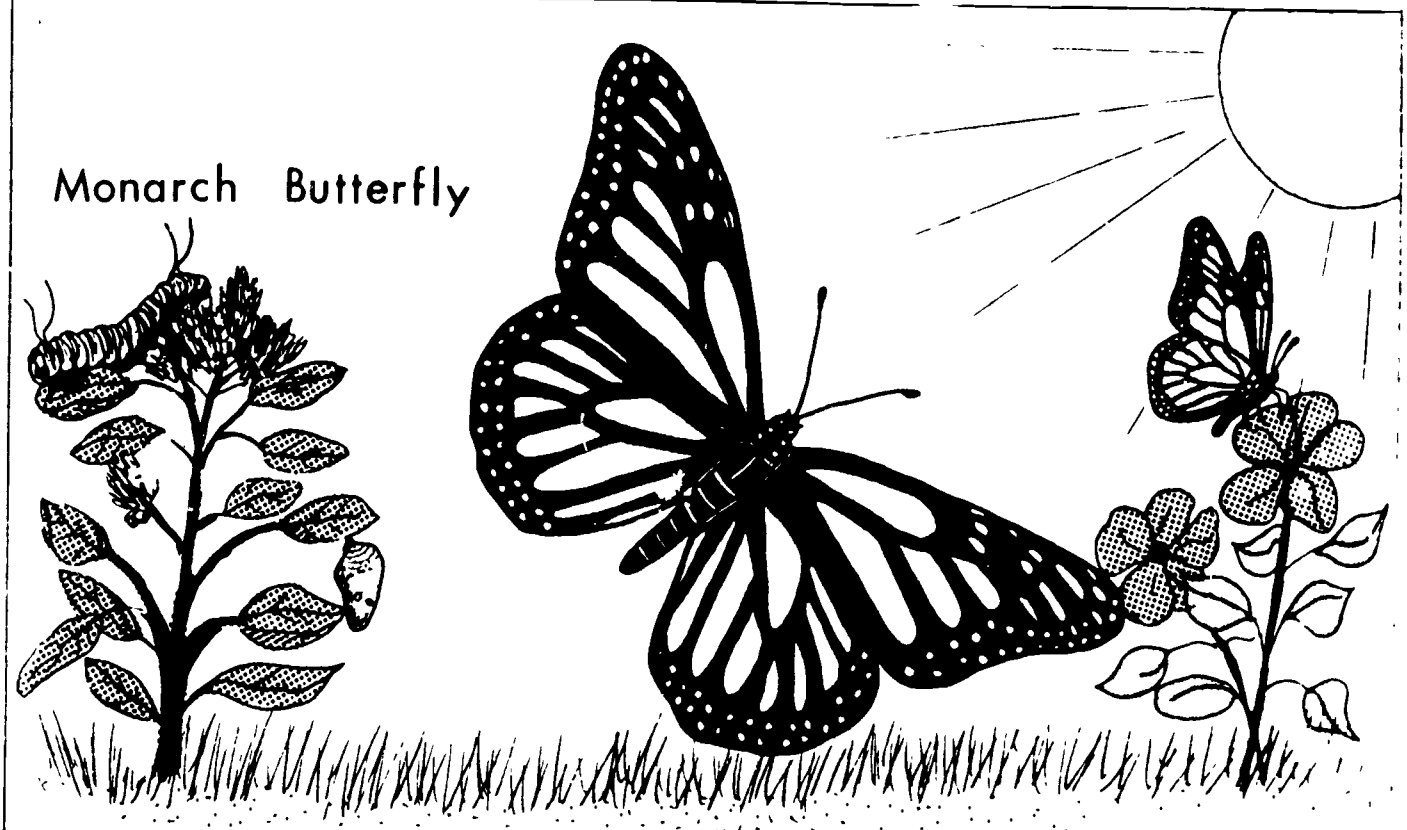
1. tongue depressors or popsicle sticks - cage
2. glass jars
3. tin cans

Be Kind! Let them go soon after you've studied them.

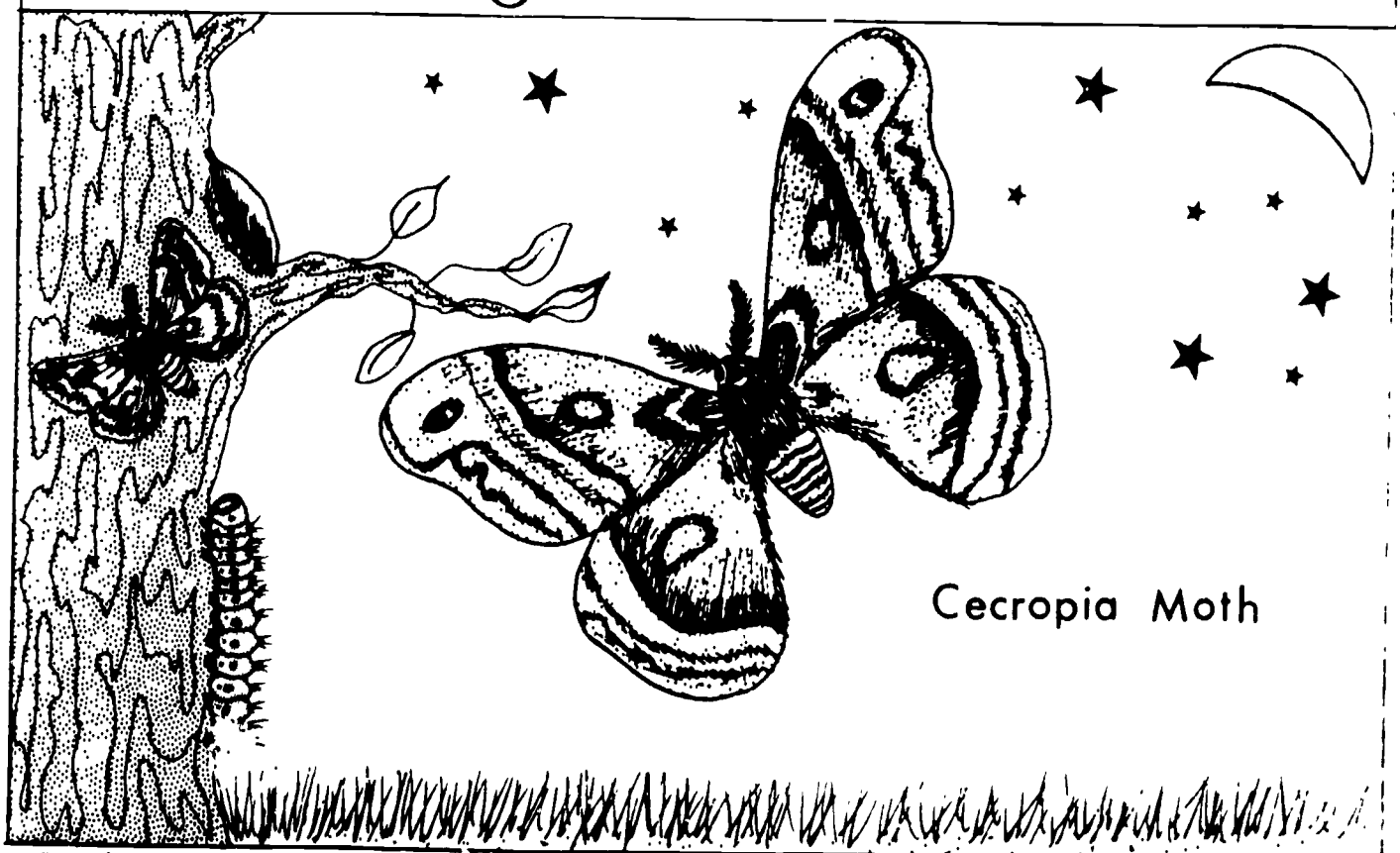
C A P T U R E A B U T T E R F L Y

Get a jar with a lid. Put holes in it. Or put cheesecloth or gauze over the jar. Put your caterpillar in the jar with a branch from a tree. Add leaves for caterpillar to eat. Look for it to form a chrysalis. Soon a butterfly will come out.

Daytime Butterflies



Nighttime Moths



The Butterfly Usually Has:

1. _ _ _ _ _ _ _ _ antenna
2. a _ _ _ _ _ _ _ body
3. a _ _ _ _ _ _ _ _ _ _ that protects its pupa
4. active _ _ _ _
5. _ _ _ _ _ _ _ wings at rest
6. a _ _ _ _ _ _ _ caterpillar

The Moth Usually Has:

1. _ _ _ _ _ _ _ _ _ _ antenna
2. a _ _ _ _ _ body
3. a _ _ _ _ _ _ that protects its pupa
4. active _ _ _ _ _ _
5. _ _ _ _ wings at rest
6. a _ _ _ _ _ caterpillar

Word List

open	hairy	closed	days
nights	feathered	clubbed	smooth
broad	chrysalis	narrow	cocoon

B U G R A C E S

The best animal to use for races is an isopod, sometimes call a pill or sow bug. The best activiy requires both types in order to study the animal behavior as related to that animal's physical structure.

The isopods can be found in dark, moist undisturbed spots with decaving plant matter. You can find them under boards, logs, near the house, under rocks and piles of grass or mulch.

When you find the isopod, place it in your hand. If it rolls up into a hard ball or cannot flip over if placed on its back, vou have a pill bug. If the isopod has two tail-like appen ,es and quickly flips from an upside-down position onto its feet and runs, it is a sow bug.

There are two ways to have a bug race. One is to draw a circle, tie a piece of chalk to the end of a two foot string. Use the chalk and string as a compass to draw several circles onto the black top. The race should be introduced as a way to investigate the behavior of the isopods. Use a hand lens and look closely at the isopods. Think of the race as a simulation in which isopods are dropped by a hungry bird and try to escape being eaten. Make a "bird" beak from a piece of paper rolled up as a funnel. Use two isopods at a time per circle. They are dropped thru the funnel into the middle of the circle. The first to get over the line wins. No flipping over of upside-down isopods. Several heats may be run, and two final winners.

QUESTIONS:

Which kind of isopod won most of the races?_____

Why do you think these isopods won? _____

_____ _____

What effect did the size of the isopod have on its finishing position? _____

_____

How do you think slow isopods protect themselves? _____

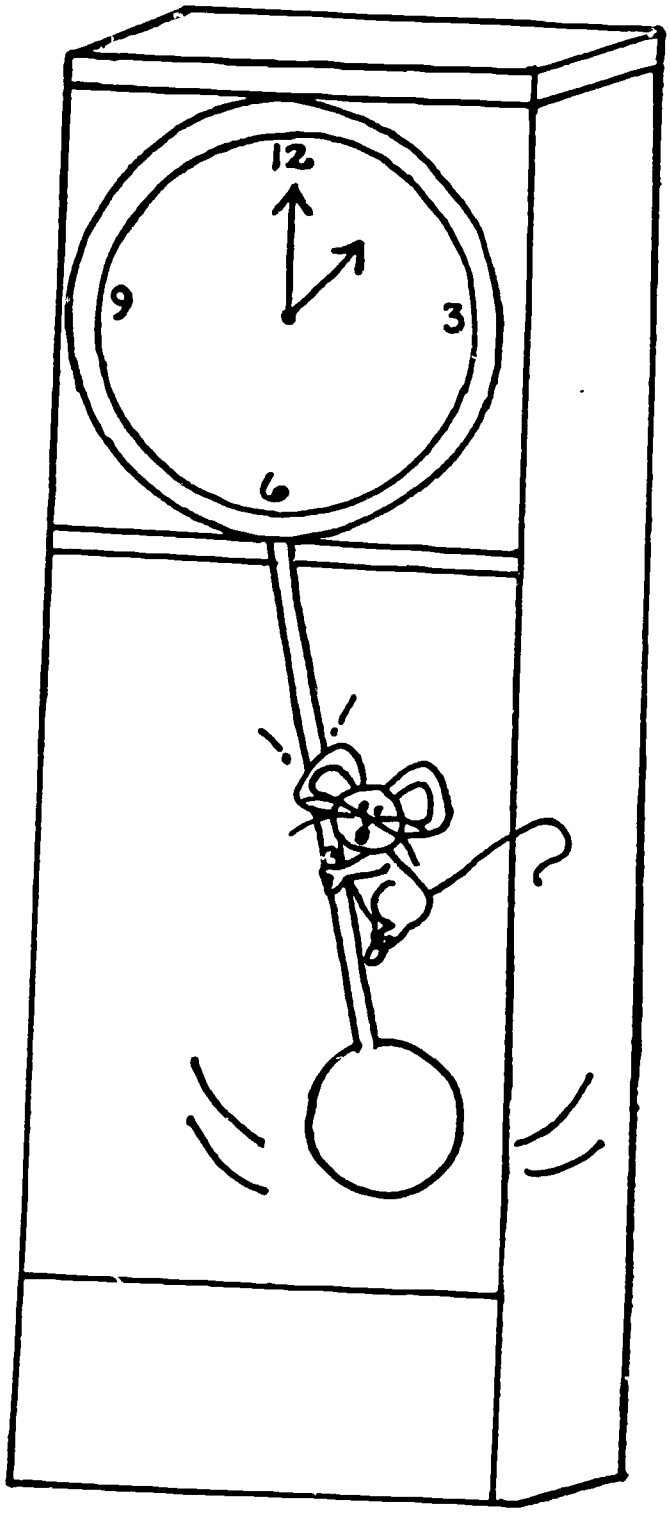
_____

_____

_____

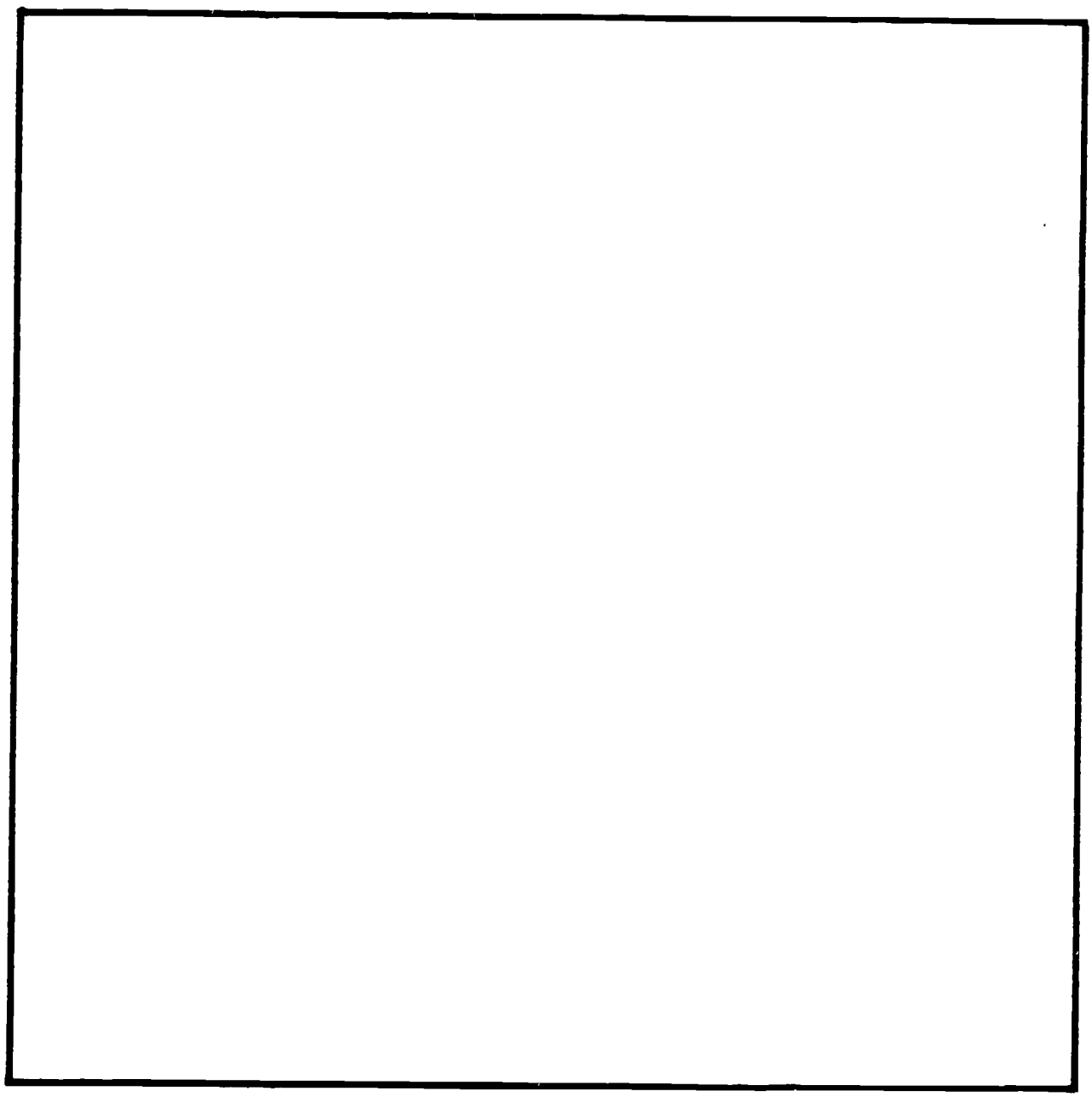
Return the isopods to the places where they were captured. Another way to race the isopods, if you find only one type, or want a follow-up, is to make a racetrack from a cardboard box. Glue lane partitions down a long box, about four to a box. Put one end on a slight slant (not too much as the pill bugs might roll). Each student will put their pillbug into the starting area. A starting gate can be made that fits over the lane partitions and can be lifted up when the race is ready to go. In this race no one can touch their "racers" to get them going. As many heats as necessary can be run until the final four are found.

This type of race can also be done with beetles or other crawling animals.


12
3
6
9

A B O U T M E

Trace your hand on this page. Use your centimeter ruler to measure the length of your fingers.



thumb _____cm
pointer finger _____cm
ring finger _____cm

little finger _____cm
middle finger _____cm

B E T T I E A N D M E

On the next page is a picture of Bettie. Measure her face with your centimeter ruler. If you do not have one available, cut the one out of the page that follows the picture of the face. When you have finished, color the picture.

nose _____cm long

eyes _____cm long

ear _____cm long

mouth _____cm long

Extra activity:

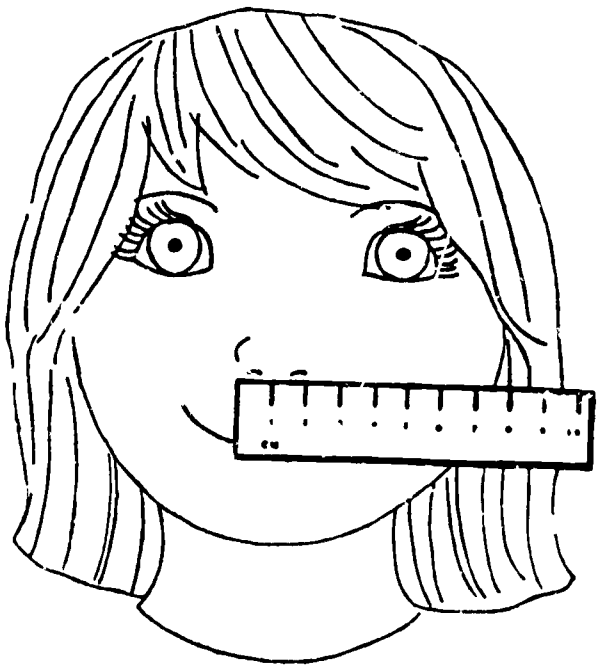
Note - Please make sure that you do this activity safely. Work with a parent or a friend. Measure your face.

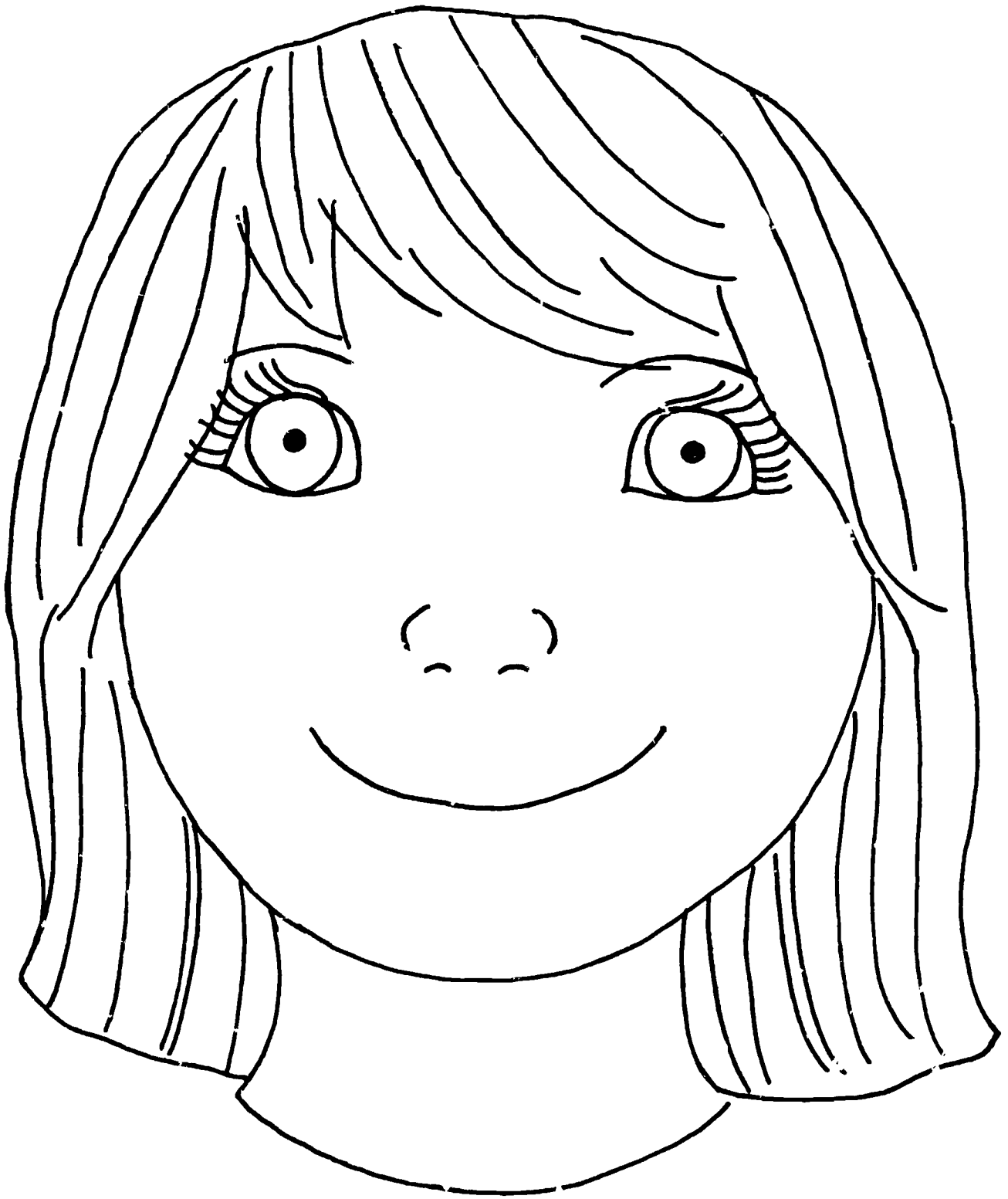
My nose is _____cm long

My ear is _____cm long

My mouth is _____cm long

My eyes are _____cm long

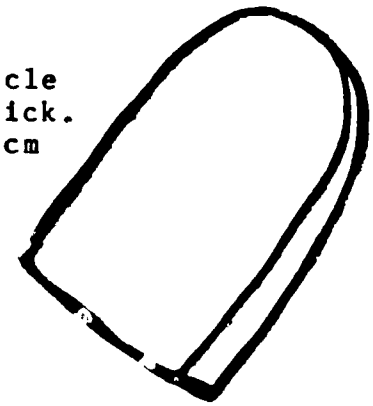




M E A S U R E M E N T

Use your centimeter ruler to complete these pictures.

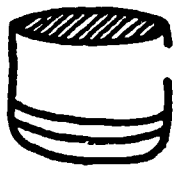
This popsicle needs a stick. Make it 5 cm long.

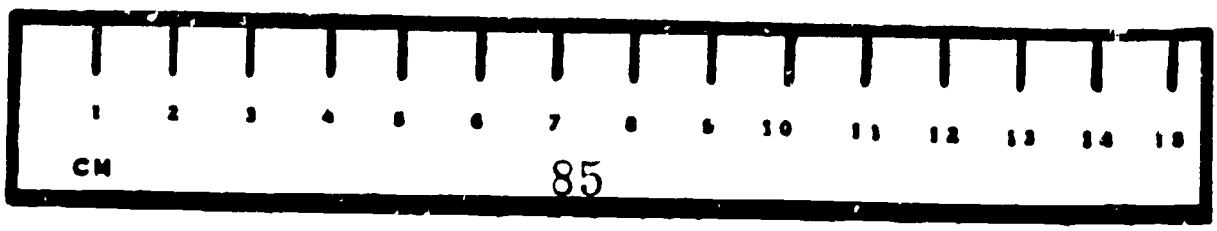


Make a rake handle that is 9 cm long.

Make the straw 9 cm long.

Make the handle on this pot 2 cm long.

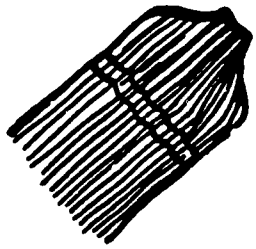




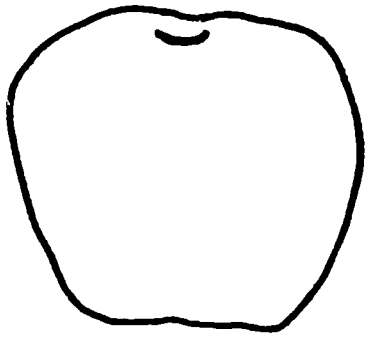
M E A S U R E M E N T

Complete these pictures.

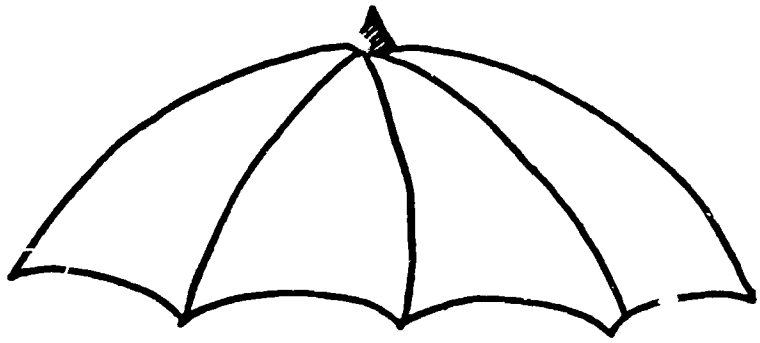
This is a broom. Put a handle on it.
Make it 11 cm long.

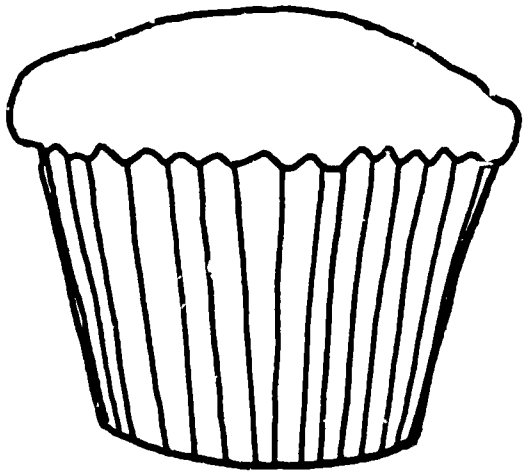


Make a stem on this apple that is 1 cm long.



Draw a candle on the cupcake.
Make it 4 cm tall.





This is an umbrella.
Make a handle for it
that is 4 cm long.

H O T T E R O R C O L D E R?

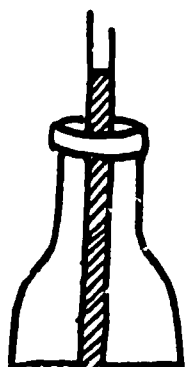
You need a thermometer to find the temperature.

How to Make a Simple Thermometer:

Take a clear bottle and fill it halfway with water colored with ink. Put a hole in the lid and push a clear plastic tube through it. By putting your mounth on the tube, adjust it so that the water comes to stop about halfway up the tube. Put the bottle in a sink and pour hot water over it. The colored water will rise in the tube. Repeat with cold water and the level will fall.

*The level indicates the temperature of water poured over the bottle. The hot or cold water causes the air inside to expand or contract, making the colored water rise or fall in the tube. In a real thermometer, the liquid expands or contracts in the same manner.

colored



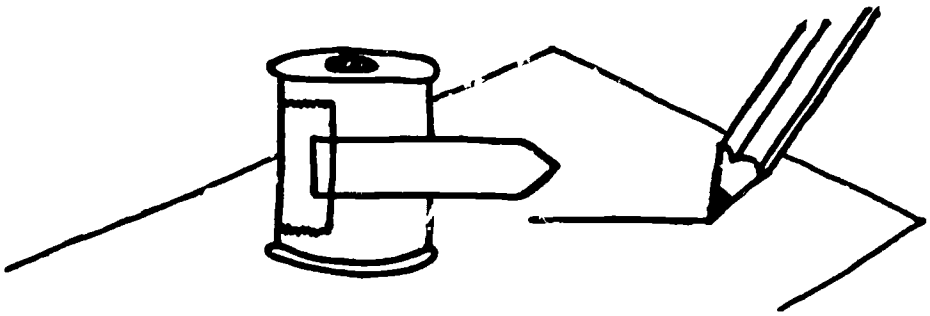
Seal the lid with plasticine clay and fit it tightly to the bottle.

HOT

COLD

G U M W R A P P E R T H E R M O M E T E R

You can make this little machine to tell temperature with junk from around the house. All you need is a spool, some tape, and some of the silver paper that comes wrapped around gum.



When metal gets hot it expands, getting longer and wider. A curved shape lets the two strips stay together with the metal arc taking more room.

1. Cut a pointer from the gum wrapper. (Make sure the wrapper is the kind with foil on one side and paper on the other.)

2. Tape it to the spool. Anything like a little bottle or a felt marker will work.

3. Set it on a paper and mark where the pointer is. Watch the needle swing around when the temperature changes.

By the way, this thermometer doesn't tell you how hot it is. It just tells you if it's hotter than it was. But you already knew it was hot.

Think about bi-metal strips for a moment. (It will take your mind off the heat.) The reason this little device works is that the pointer is made of two different materials. Paper and metal foil do not react the same way when exposed to the same amount of heat. The foil expands at a much faster rate than the paper. The difference is shown.

The thermostat in your house works on the same principle. It keeps track of the temperature by expanding and contracting.

W E A T H E R G R A P H

Try to keep this weather graph for one month. You may use the weather graph in the following ways:

1. Cut the appropriate weather symbol from the attached sheet and record the daily weather conditions on the graph.

2. Reccrd daily temperatures using your own thermometer.

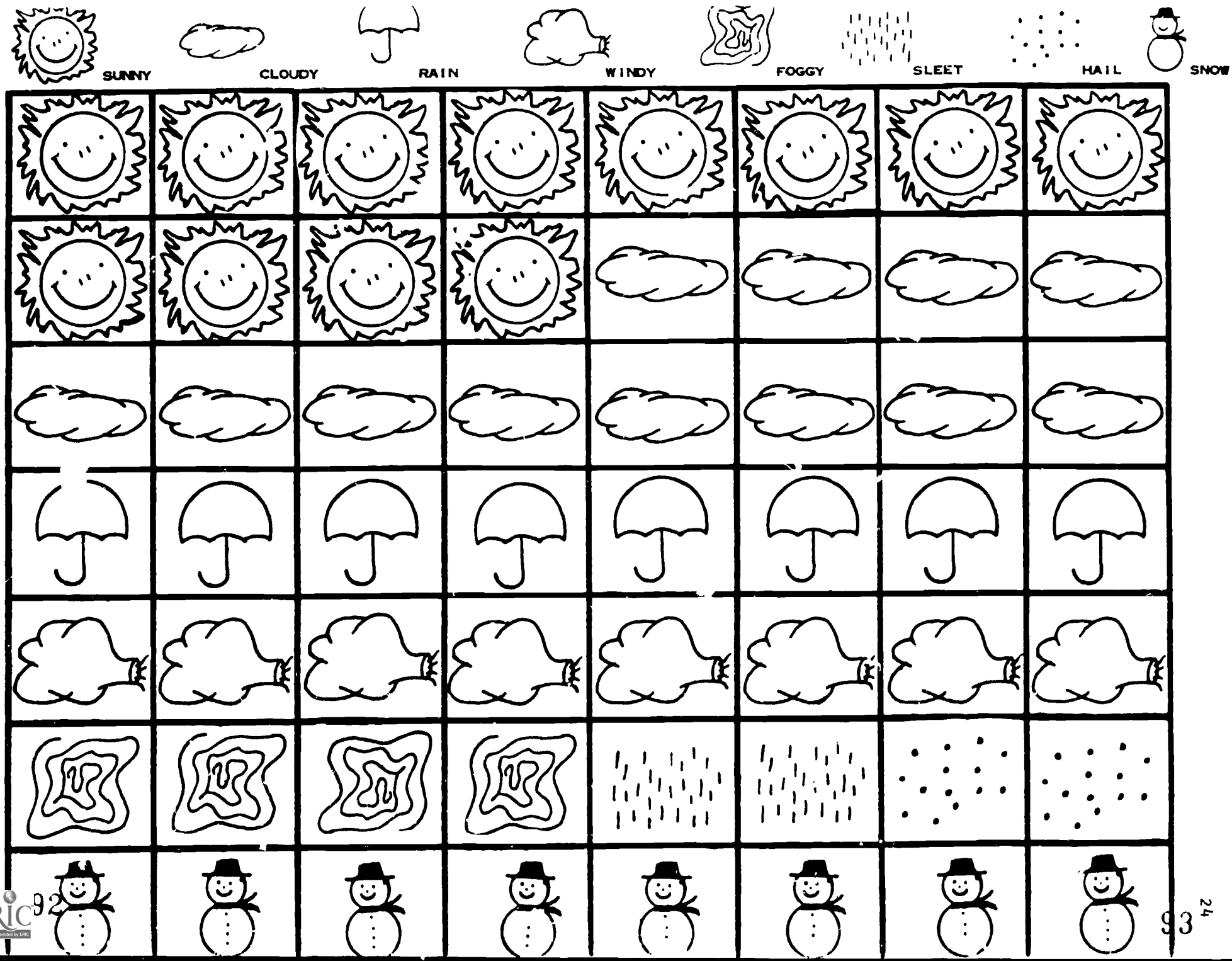
3. Pretend you are a weather forecaster. Predict what you think the weather will be the next day. You would want to include the temperature, wind direction and speed, and weather conditions.

4. Use the sheets that follow to record the predicted weather for the next day from both the newspaper and the weather forecast on the television newscast. Use the last column to record the actual weather for that day.

5. Compare today's weather with the weather one year ago.

WEATHER GRAPH

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday


SUNNY
CLOUDY
RAIN
WINDY
FOGGY
SLEET
HAIL
SNOW

PREDICTIONS		ACTUAL
Television	Newspaper	
Date Temperature High Low Wind speed		
Date Temperature High Low Wind speed		
Date Temperature High Low Wind speed		
Date Temperature High Low Wind speed		
Date Temperature High Low Wind speed		
Date Temperature High Low Wind speed		
Date Temperature High Low Wind speed		

MEASUREMENT SEARCH

H I Z G Z G L P J C R H F Z H R B C P E O D G E E C I Y O D O O
S R O V A X H O H E H L R X U C O Y M B S H M P C O T V V F A W
O L F A X Z W Y T G J U C B D R L D P B O I T A F A P Z Z S T C
W C C J C S N A Z M X H H J Y U I O F L O R A P H A A C R S A N
F F S O L J W T V D E M C W L T F O C H D E C E V M U X I S O E
C B R C O I J W U J E L U J E R N C H H X C X H M H M I H V O P
G E F G U L O O N A H W X I N H H G L R R T E R O M W L K C T D
V I L C A D F U L J P D M U E G A T V V J H A D Q B P Z P S D S
O S X S S P M U I B Y J P B O Y J P F W M W D B U L B R E N S C
O B N U I H A R H D N P R F H X L N O V T J T H G M E C N C D M
J W X H A U E D D A I Z Z B Z F S X Y N W H F N M T U E D I R E
V E C J I L S N C H T O G Y O M D U R M B D B M E N D N U D O A
T C N W U F O I Y O U B O N M J I R O N L X T M L C X T L P Ç S
Z O I R F D R T I M E G X F M W I Z N O J G O B Y V R I U A N U
P A N U J T M W V M O O Y O H V O I C M D M O I P J Z M M F S R
I F U F E J S O U J G S R G H P X Q R I R E Z W C G M E T M Z E
O E U M B Z B L C G J J H T I H A G R E H Z N N U X S T X W G W
J H O F I N E V I L J I G W J L H M H U T O C E G R X E B H H A
N D S A J B M S L E A N I U G M F T S W I N G S A F Y R H F B J
M E O D P 1 C T N M E G H H T M O G X R Z A S O N T L M W F S L
N G G A C P X T Z L C Z H O W Y K N O C T N T J J G Z Y H L E V
J R U Z B F E D D Z I A Y T D W Y Y G X R V P O G X O F A V I H
L E H A P T M S Y A G V U W X D Q B O J N O K S H L P Y J G W S
P E O K X D O I L P V W E S I G N A D T M S Y Z H V R T S T O O
I S W X T R S U W R B X H H H I G F Z O C V M O B O D G N U T P
I O A I T H Y O R H D F L X P B X E R L H H N P A Y Q H F H U Z
R T T L C J Y O H L M P N S M X V G Z M Y H X G T J Y R P L A I
T I S B X O O S L Y M P W H L O Z M E T E R R C A Y O U O H H Z
C W V S R V P I Z Y Z S Y W G H B W H H D P R J D F U Z B B D U
O S F E B P O F F R P A Z L I T N M V P M G U M S O S J D O P H
L C H F P U L E O V U E Y X S N I L V S Q M B V C Q M L V D M O
C S A M Y S U A O H O J N S C D I F Y B I V A S I O F O U Y C Z

THERE ARE 30 WORDS HERE - CAN
YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

BULB
CENTIMETER
COLD
DEGREES
LENGTH
MEASURE
METRIC
RULER
THERMOMETER
WARM
CELSIUS
CLOCK
COOL
HOT
LIQUID
METER
PENDULUM
SWINGS
TIME
WATER

M E A S U R E M E N T M O B I L E

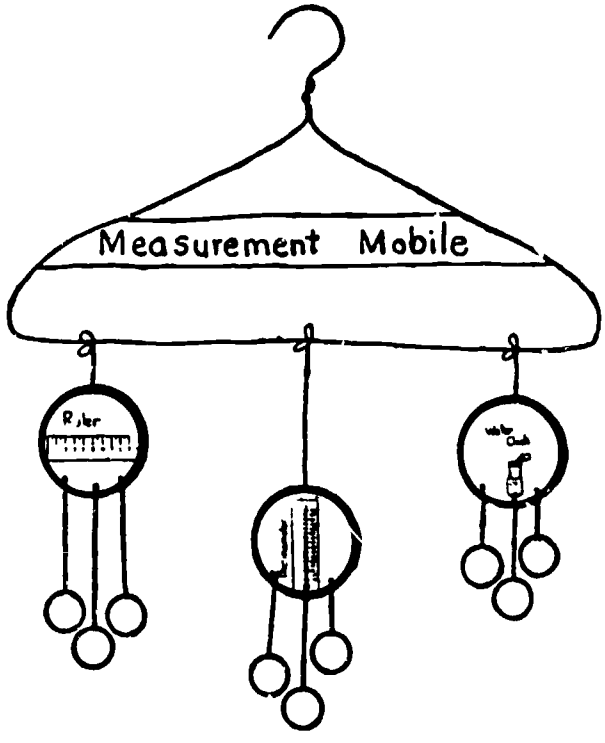
What things can we measure with a ruler, a thermometer, or a water cl ck?

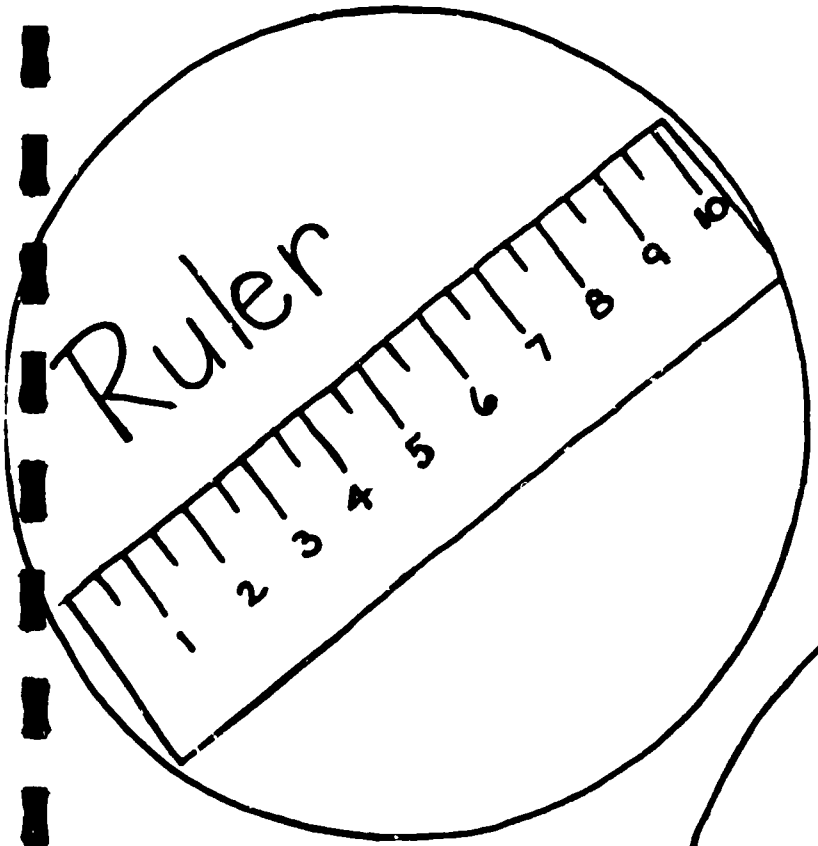
You will need to provide:
- a hanger or cardboard
- some yarn
- scissors
- paste
- pictures from magazines or newspapers

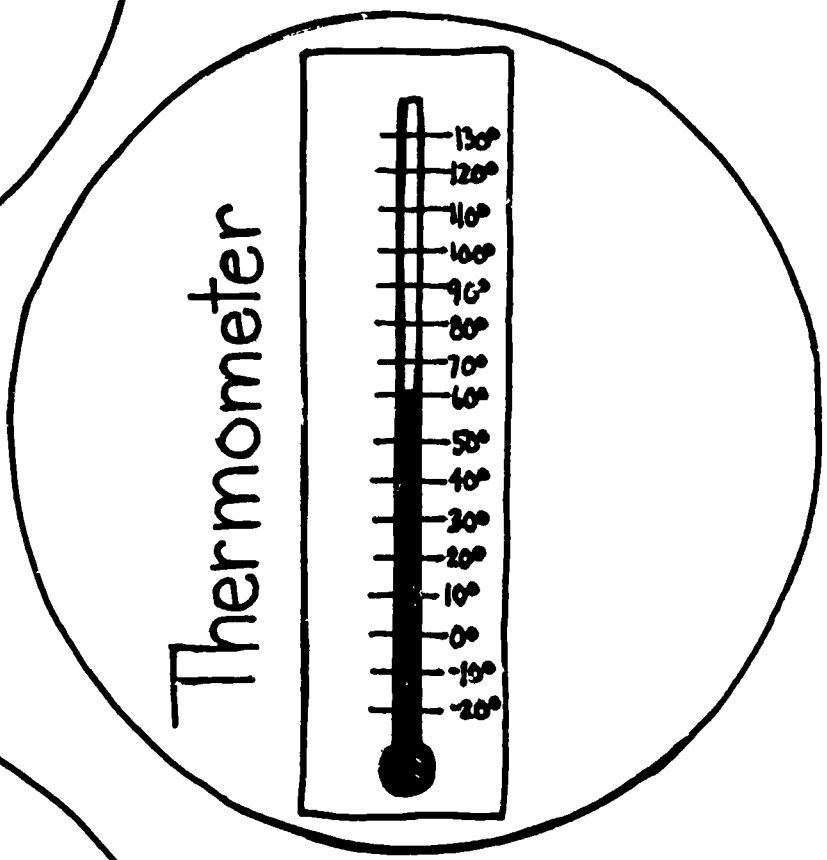
To make this mobile:

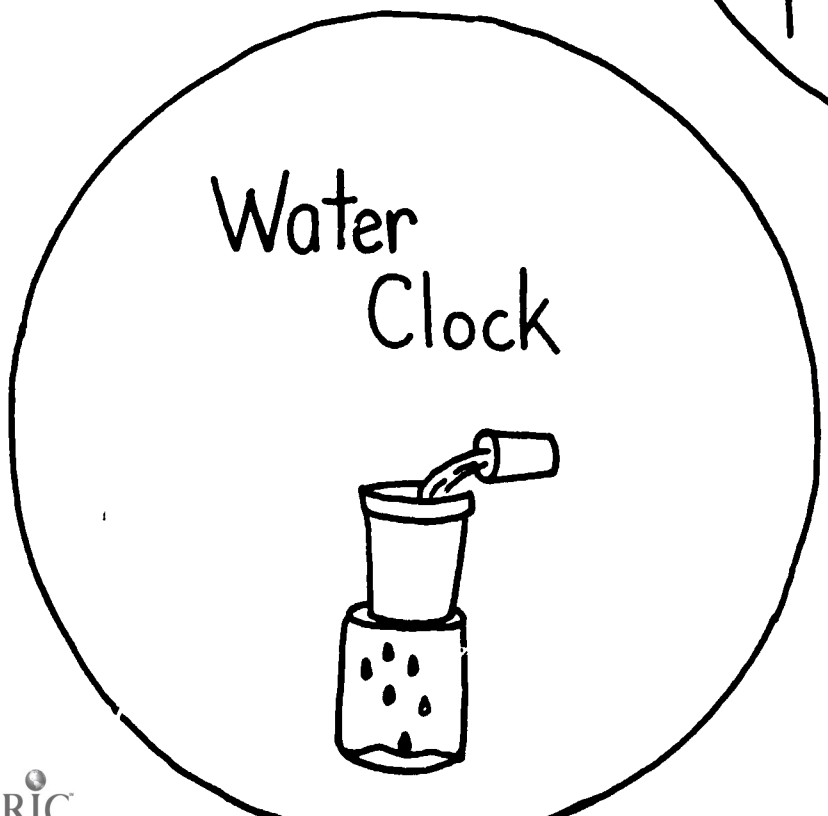
1. Cut out 3 pictures of the measuring tools.
2. Attach them to the hanger with yarn.
3. Cut out pictures of things that you can measure with these tools.
4. Paste them on a piece of tagboard or cardboard.
5. Attach them with yarn under the correct tool for measuring.

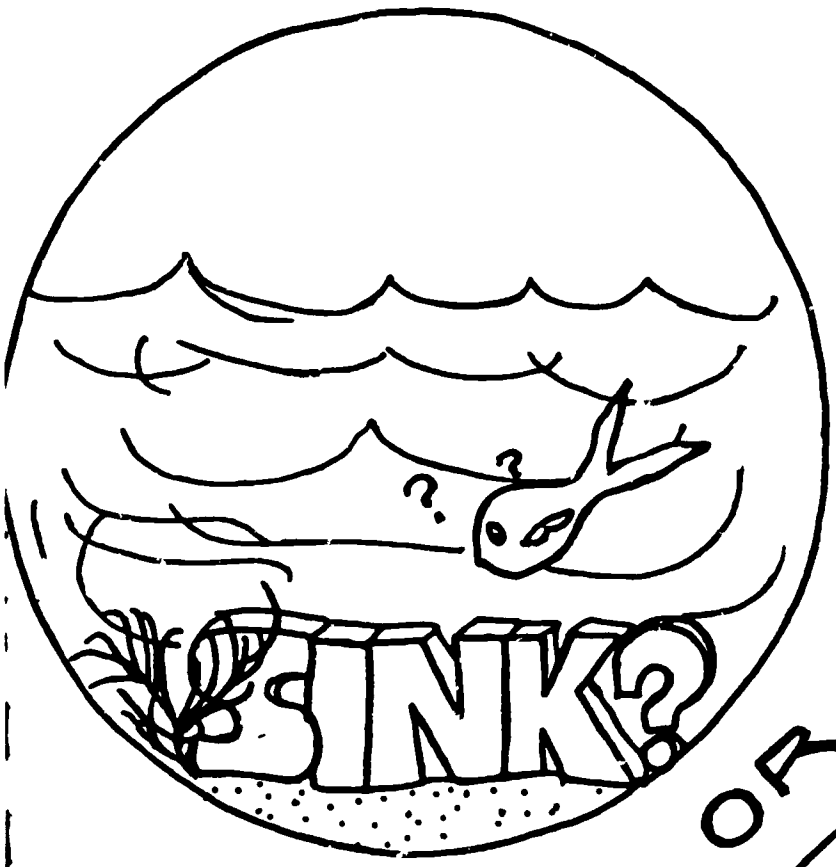
Sample mobile:



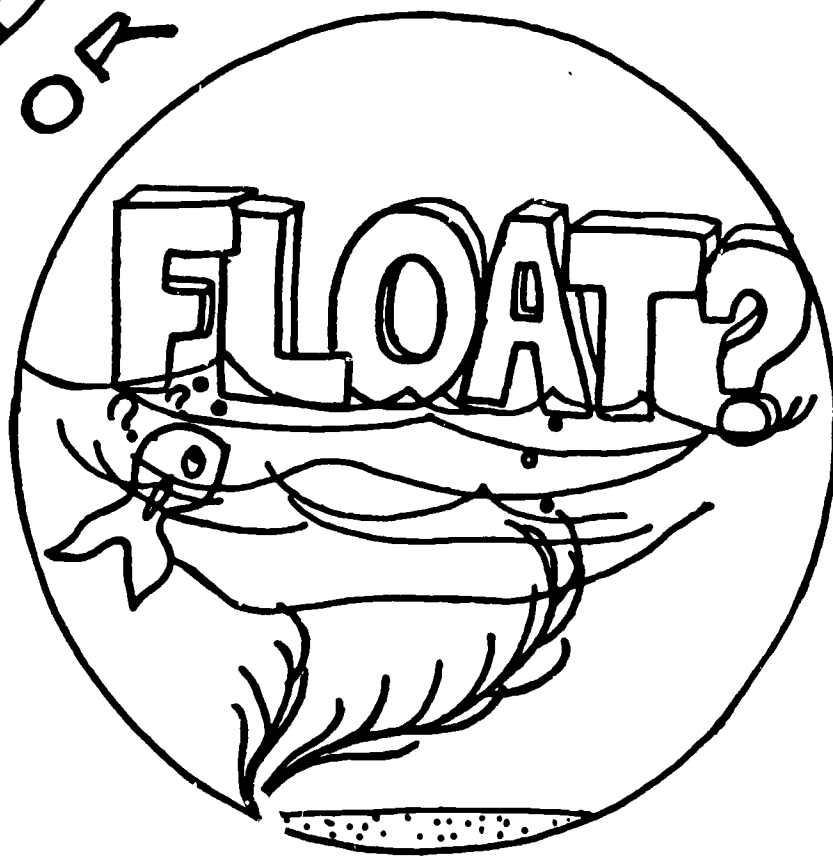

Ruler
1
2
3
4
5
6
7
8
9
10


Thermometer
130°
120°
110°
100°
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
-10°
-20°


Water
Clock



OR



SINK OR FLOAT

W H A T M A K E S T H E B O A T G O?

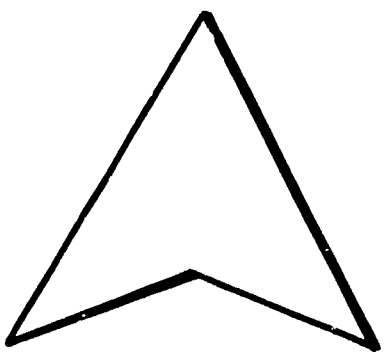
By using a piece of cardboard and a chip of soap, you can make a little boat that will sail. Cut the cardboard in the shape of a boat and, in a little V in its stern, insert the bit of soap. Place your boat in a pan of water and it will move mysteriously about until the whole water surface has been weakened by the soap. The larger the surface of water, the longer it will sail. If you replace the water, a stalled boat will start again.

*Note: Ivory soap would work best.

Now look up surface tension in a book at the library. Write a paragraph on what you find. Indicate how the soap's effect upon surface tension made the boat move.

P A P E R S P E E D B O A T S

Make a paper speedboat as shown and float it. Now place a drop of liquid detergent on one finger. Gently lower it into the water just behind the speedboat, and the boat will shoot forward as if by magic. This trick will only work once. To make it work again, you'll need fresh clean water.



Make the speedboat by cutting a boat-like shape out of flat card or stiff paper.

Now look up surface tension in a book at the library. Write a paragraph on what you find. Indicate how the soap's effect upon surface tension made the boat move._____

_____

_____

_____

_____

_____

_____

_____

B U B B L E M A N I A

Recipe for bubble mix:

1/2 cup liquid detergent to 1 quart of water

By adding 1/3 to 1/2 cup of glycerine and a pinch of sugar to your bubble water, you will have large bubbles that hold their shape longer than the kind you can buy in the store.

You can make a giant bubble blower from a coat hanger, an embroidery hoop, or a foil pie pan with the center cut out. Dip in the bubble mix and blow the largest bubble you ever made.

Write down the size of your bubbles.

Note: You can buy glycerine at most drugstores, but it is expensive.

What do you suppose holds the bubble together?_____

_____

O N T H E M O V E

Empty a bowl without trying.

Make water go from one bowl to another without touching the bowl or the water. Take a clean handkerchief. Lower one corner into one bowl of water and place the opposite corner in another bowl. The water gradually spreads through the handkerchief, so that the lower bowl slowly fills with water.

Note: Be patient. This takes time to work.

Write a couple of sentences that explain why this happened._____

_____

_____

_____

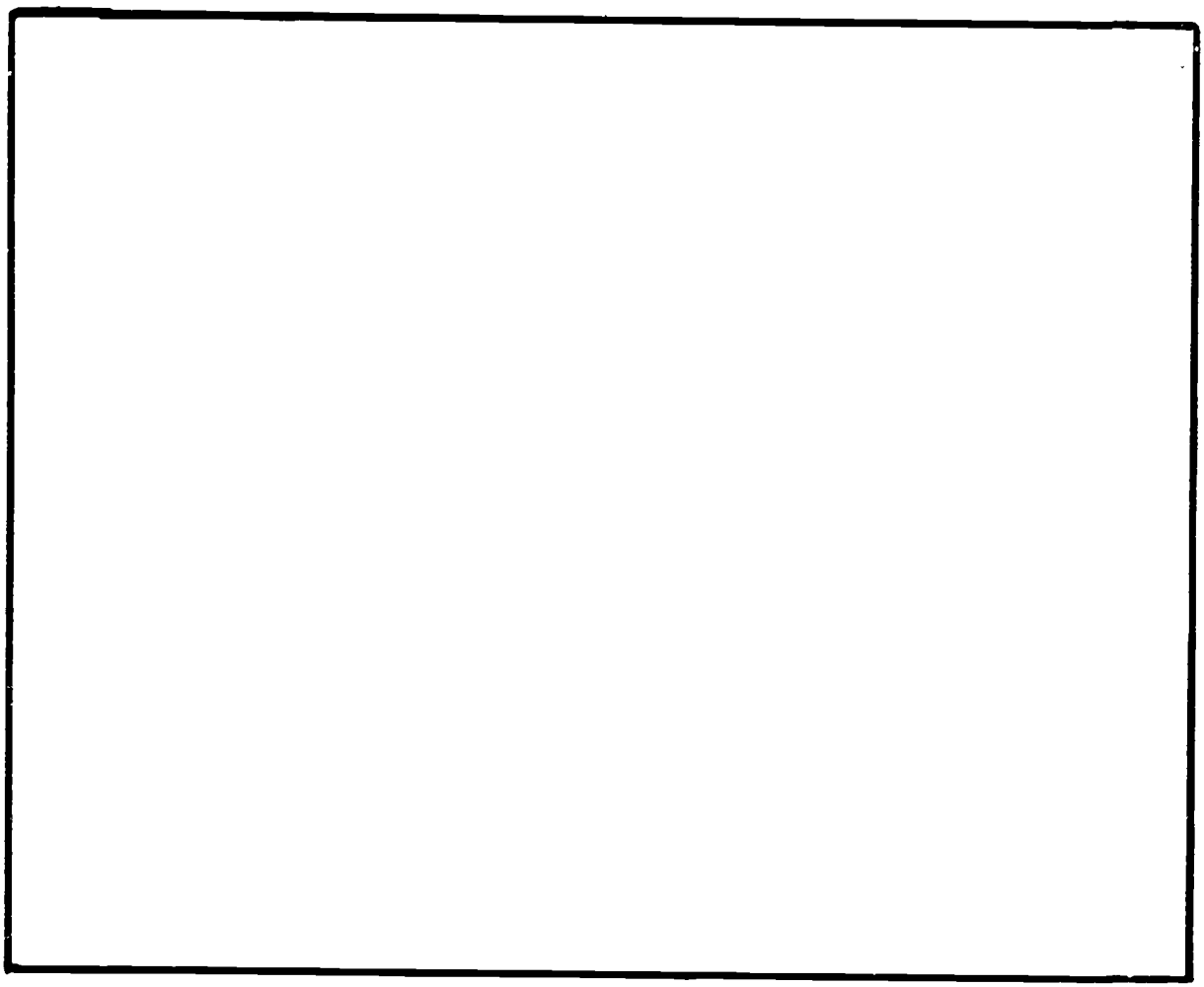
_____

S I N K O R F L O A T

Directions:

1. Choose your favorite piece of fruit. Then construct or make a boat. It should hold your piece of fruit or cause it to float when they are placed in water.

On the next page, draw a picture of the boat you constructed.

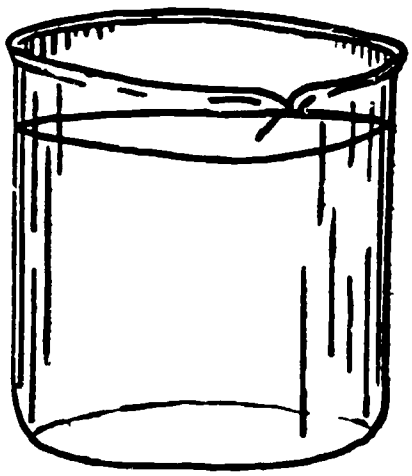


MAKING A HYDROMETER

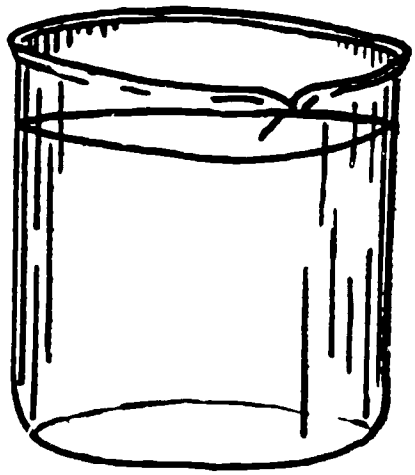
Do these with the help of a parent. Take a pencil and mark a scale along its length. Stick a small lump of modeling clay to one end. Adjust the clay so that the pencil floats upright in a container of water. See which mark on the scale is at the surface. Now float it in some salty water and then in some rubbing alcohol. See which marks are at the surface now. Draw a picture of your hydrometer in each solution.

Note: Do not taste or drink the alcohol.

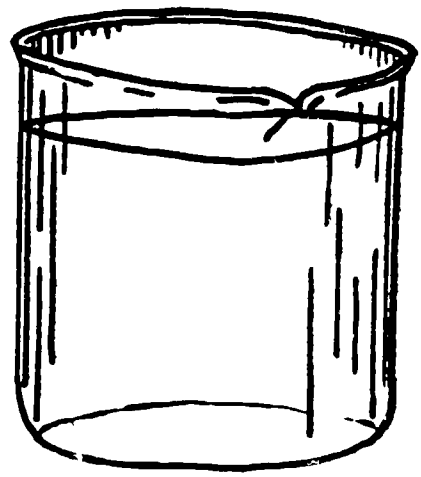
My hydrometer in water



My hydrometer in salty water



My hydrometer in rubbing alcohol



R I S E, R A I S I N, R I S E

You will need a glass of light-colored soda and a few raisins.

Put the raisins in the bottom of the glass and pour in the soda.

Watch what happens!

This is what I saw happen.

What did you see on the raisins?

I predict this happened because

Now, try putting a few raisins in a glass of very flat soda.
What happened this time?

What can you conclude was different about the two glasses of soda that caused the raisins to rise?

L I Q U I D L A Y E R S - F L O A T I N G I N O R D E R

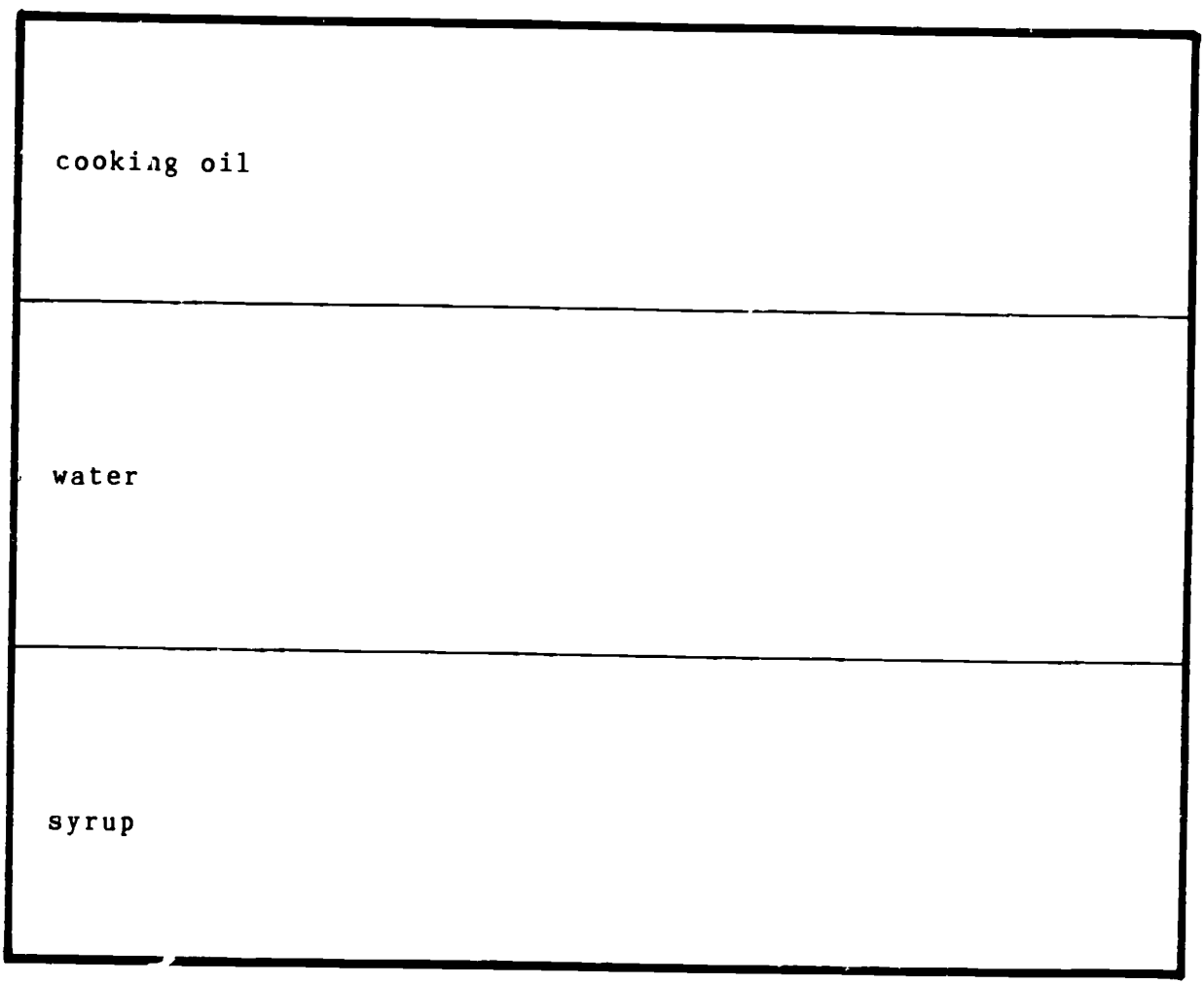
Take a glass and pour some syrup in it.

Next pour some cooking oil on to the syrup and then add some water.

The three liquids will form separate layers floating on one another.

Now place a small grape, a piece of candle, and a piece of cork in the tumbler.

Draw a picture showing where each of the above objects floated.



F L O A T A N E G G

A denser liquid has a greater upward lift or buoyancy. Salt makes water denser. Now you know why ships ride higher in ocean water than in fresh water, and why you can find it easier to swim in the ocean than in a lake.

DIRECTIONS:

1. Place an egg in a glass of fresh water. Notice what happens. Add salt to the water, stir gently, and observe what happens.

_____

_____

2. Put a tack in the eraser end of a pencil and place the pencil in a glass of fresh water. Add salt, stir gently, and notice what happens.

   You will see that: What happened to the egg and pencil in the fresh water? As you add salt what happened to them? Why?

_____

_____

_____

_____

_____

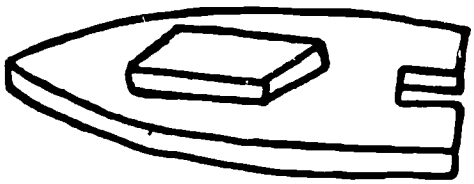
_____

P A D D L E - W H E E L B O A T

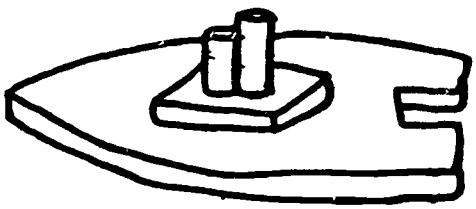
A boat powered by a rubber band.

1. Carve a pointed hull from a rectangular piece of light wood.

2. Glue or nail a block (square) on top for a cabin.

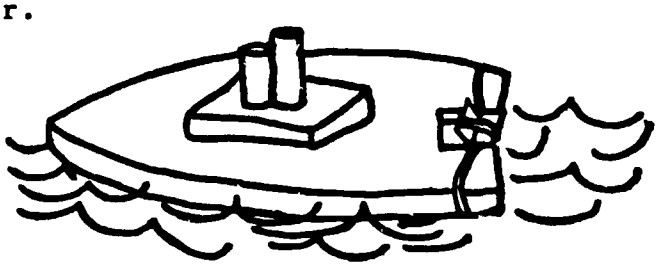


3. Use 2 dowels for smokestacks.



4. Cut slots in 2 pieces of wood for the paddle wheel as shown.

5. Glue paddle wheel pieces together. Put several rubber bands around them, fastening the loose ends to the 2 grooves in the end of your boat.



6. Wind up the rubber band motor by turning it backwards.

7. Place your boat in the water and watch what happens.

STUDENT NAME:_____

SCIENCE TEACHER_____
(1985-86)

NOTE TO THE PARENT:

Please use this sheet to record what activities your child has completed and when. Any comments you might wish to make about individual activities will be most helpful. All students who complete any amount of activities and eturn this sheet to next year's science teacher will receive a certificate recognizing their efforts. However, those youngsters who complete 22 or more of the activities will receive a gold medal certificate.

DATE	TITLE OF ACTIVITY	PARENT COMMENT
☐	INSECT PUZZLE	
☐	KINKY CATERPILLER	
☐	WEB COLLECTING	
☐	MOSQUITOS	
☐	ANT WATCHING	
☐	ANT FARM	
☐	INSECT HOMES	
☐	CATCH A BUTTERFLY	
☐	BUTTERFLY/MOTH	
☐	BUG RACES	
☐	ABOUT ME	
☐	BETTIE AND ME	
☐	MEASUREMENT	
☐	HOTTER OR COLDER?	
☐	THERMOMETER	
☐	WEATHER GRAPH	
☐	MEASUREMENT SEARCH	
☐	MEASUREMENT MOBILE	
☐	BOAT	
☐	PAPER SPEEDBOATS	
☐	BUBBLE MANIA	
☐	ON THE MOVE	
☐	SINK OR FLOAT	
☐	MAKING A HYDROMETER	
☐	RISE RAISIN, RISE	
☐	LIQUID LAYERS	
☐	FLOAT AN EGG	
☐	PADDLE-WHEEL BOAT	

(OVER)

*Parent Signature*_____

As you know, this is our first attempt at a package of summer enrichment materials to go along with the elementary science program. As a parent, your evaluation of it will be most helpful as we look to expand and refine it for future use. Please take a moment and respond to the following questions:

1. How would you rate the clarity of instructions students were given on the activities they were to do?

   VERY LOW 1 2 3 4 5 VERY HIGH

2. How would you rate your child's interest in working on this package of materials during the summer?

   VERY LOW 1 2 3 4 5 VERY HIGH

3. How readily available were the materials students needed for the activities?

   VERY LOW 1 2 3 4 5 VERY HIGH

4. How would you rate what your child learned from working on this science material over the summer?

   VERY LOW 1 2 3 4 5 VERY HIGH

5. Overall, how would you rate the effectiveness of this package of materials?

   VERY LOW 1 2 3 4 5 VERY HIGH

COMMENTS:_____

APPENDIX J: CERTIFICATE

CERTIFICATE OF ACHIEVEMENT

This certificate is presented to

for participation in the **SUMMER SCIENCE FUN** *program of the Carroll County Public Schools. This award recognizes the independent pursuit of learning, enthusiastic completion of activities, and outstanding achievement in science on this the 15th day of September, 1985.*

Olin L. Adams Jr.

Superintendent of Schools

Principal

CARROLL COUNTY PUBLIC SCHOOLS

APPENDIX K:
SUMMER FUN REQUESTS

SUMMER ENROLLMENT PERCENTAGES

SCHOOL	Enrollment in Summer Fun by Grade					% IN SUMMER FUN				
	1	2	3	4	5	1	2	3	4	5
Sandymount Elementary	31	35	35	31	46	52%	54%	56%	45 %	61%
Mechanicsville	43	32	48	30	27	61%	46%	66%	41%	33%
Elkersburg	60	70	60	60	25	54%	65%	55%	57%	24%
William Winchester	75	75	55	47	27	68%	60%	55%	52%	27%
Winfield Elementary	36	35	28	28	26	73%	70%	52%	40%	58%
Westminster Elementary	63	55	47	39	17	63%	65%	59%	30%	18%
Freedom Elementary	47	46	46	57	25	48%	53%	50%	48%	23%
Total Enrollment by Grade:	355	348	319	292	193					
Total # in Summer Fun:	607	591	578	659	613					
Total % in Summer Fun:	58%	59%	55%	44%	31%					

Grand Totals:

Enrollment:	3048
Summer Fun Enrollment:	1507
% in Summer Fun:	44%

APPENDIX L:
EVALUATION CHECKLIST

EVALUATION CHECKLIST

NAME	DATE	MAKE CONSTRUCTIVE SUGGESTIONS	COMPLETES ACTIVITY	COOPERATES WITH OTHERS	PROPERLY HANDLES MATERIALS	EXTENDS ASSIGNED ACTIVITIES	NOTES

APPENDIX M:
SAMPLE ITEM BANK

1.1.C.31

Which variable is being tested?

_____height of drop

_____kind of ball used

_____surface on which ball drops

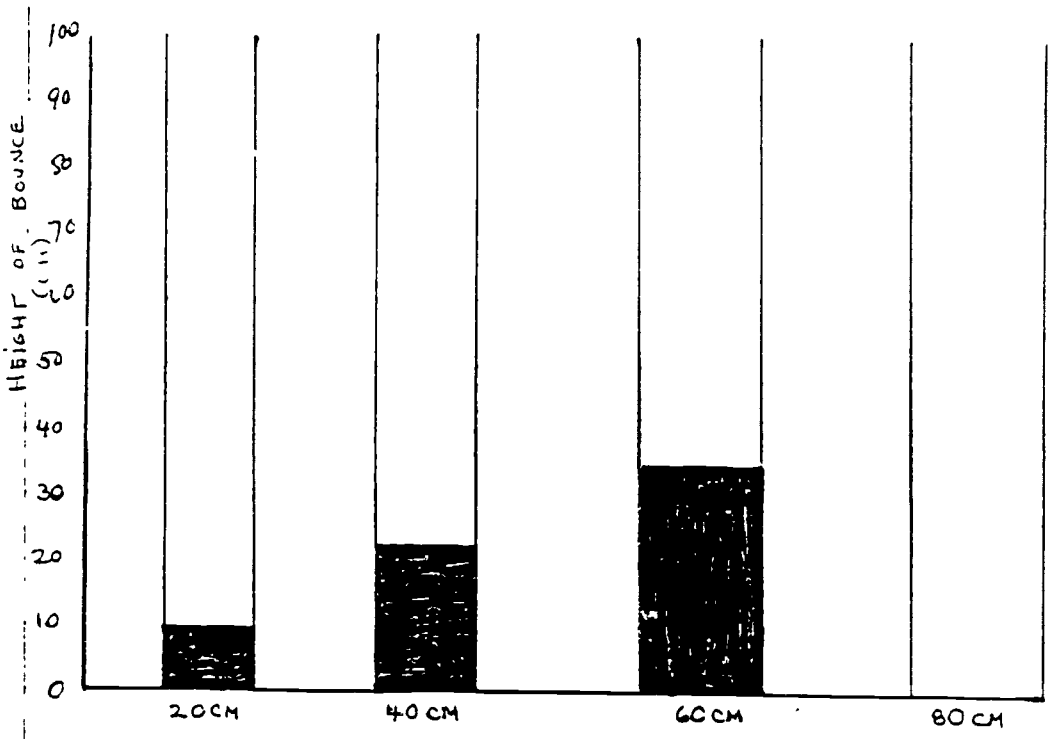
Which of these is a variable that would affect the bounce of a ball?

_____the day of the week

_____the material the ball is made of

_____the kind of measuring stick you use

1.2.C.32



Height of drop
(cm)

Use the bar graph to answer these questions.

1. When the ball was dropped from 40cm, its bounce was _____.

   _____22cm _____31cm _____20cm

2. The ball that bounced back 35cm was dropped from a height of _____.

   _____40cm _____20cm _____60cm

3. How high do you think the ball will bounce when dropped from 80cm?

   _____25cm _____43cm _____70cm

1.6.C.20

Which thing is <u>about</u> the same length as one meter?

a. pencil

b. yardstick

c. football field

d. a notebook

1.6.C.21

Which thing is <u>not</u> a standard unit?

a. click of a trundle wheel

b. meter

c. length of your foot

d. centimeter

1.6.P.30

Which is the <u>best</u> prediction for the length of the classroom?

a. 100 centimeters

b. 15 meters

c. 3 meters

d. 100 meters

2.1.2.C.22

You are given an autogiro in our science class. How would you decide how to make it spin faster?

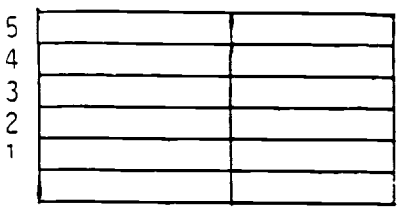
_____A. Keep dropping it and watch what happens.

_____B. Add weight and observe changes when you drop it from the same height.

_____C. Cut off wings, add weight and throw it up in the air --all at the same time--and observe what happens.

-----D. Ask a friend.

Hit The Target



A third grade class dropped autogiros from the same height. One autogiro had 2 paper clips and the other had none. The students made this bar graph.

2.1,2.C.23

Which autogiro hit the target the most times?

____ A

____ B

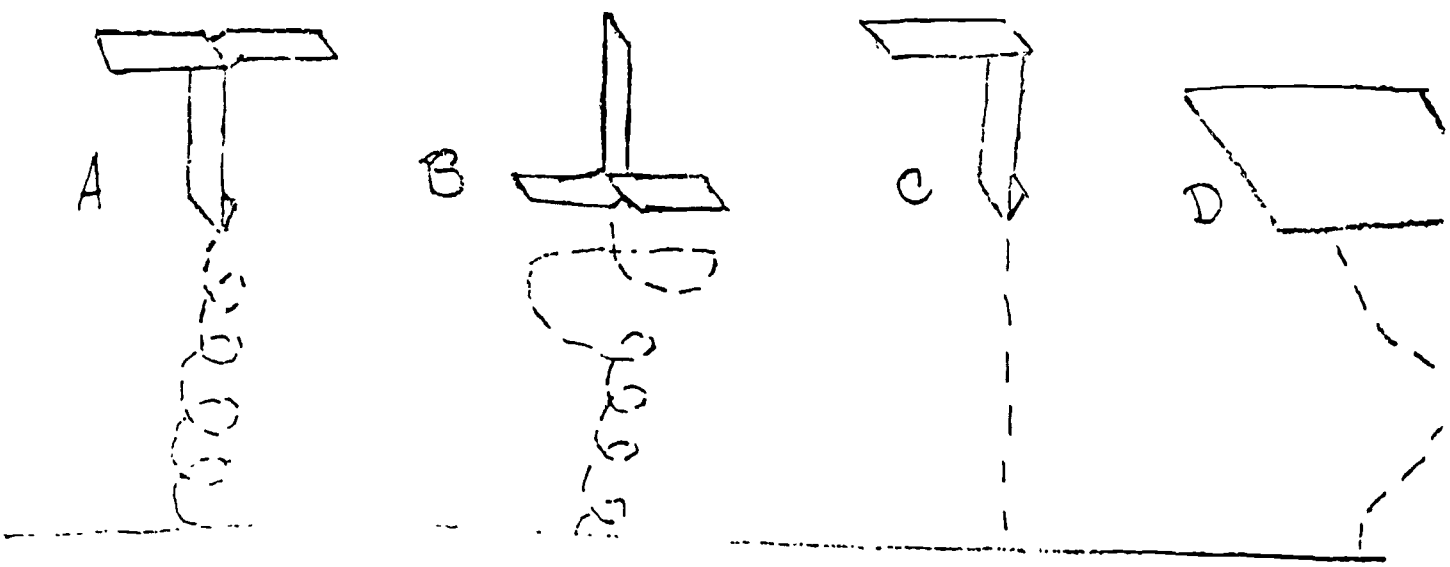
2.1,2.P.30

If you want your autogiro to hit a target the most times which would you choose?

____ autogiro A with clips

____ autogiro B without clips

2.1.C.21



Look at these autogiros. The dotted lines show how they moved through the air. Which one was not flying?

-----autogiro A

-----autogiro B

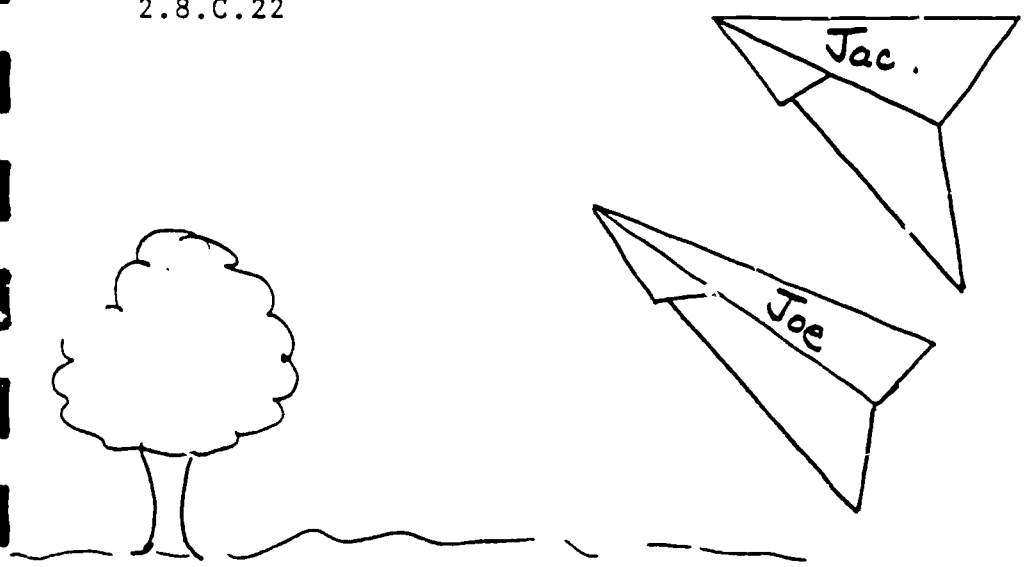
-----autogiro C

-----autogiro D

2.7.C.21

Jack and Joe each made a paper airplane exactly alike. Joe added a paper clip to the nose of his airplane. They had a contest to see whose plane would fly further. Think about the experiment we did in class. Predict who won.

2.8.C.22



Jack and Joe took their airplanes to the playground. Look at the wings on the plane above.

_____ Which plane would fly the furthest?

_____ Which plane would fly the longest amount of time?

2.7.C.23

You have an airplane you have never flown before. Which variables could you manipulate to affect the flight pattern?

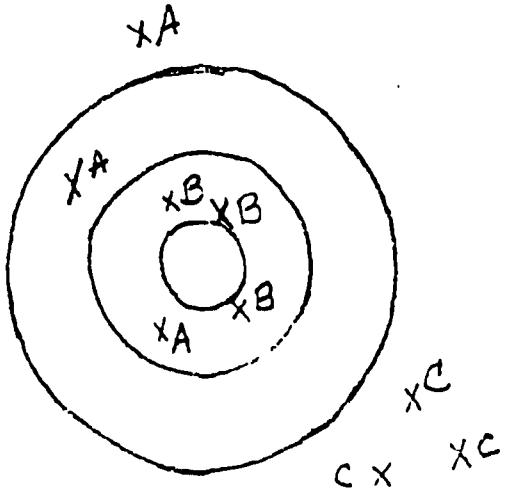
a. Design on the plane

b. Placement of weights

c. Color of paper

d. How brightly the sun is shining

2.1. C.20



Three different autogiros were dropped on a target three times each. Which autogiro was the most accurate?

-----autogiro A

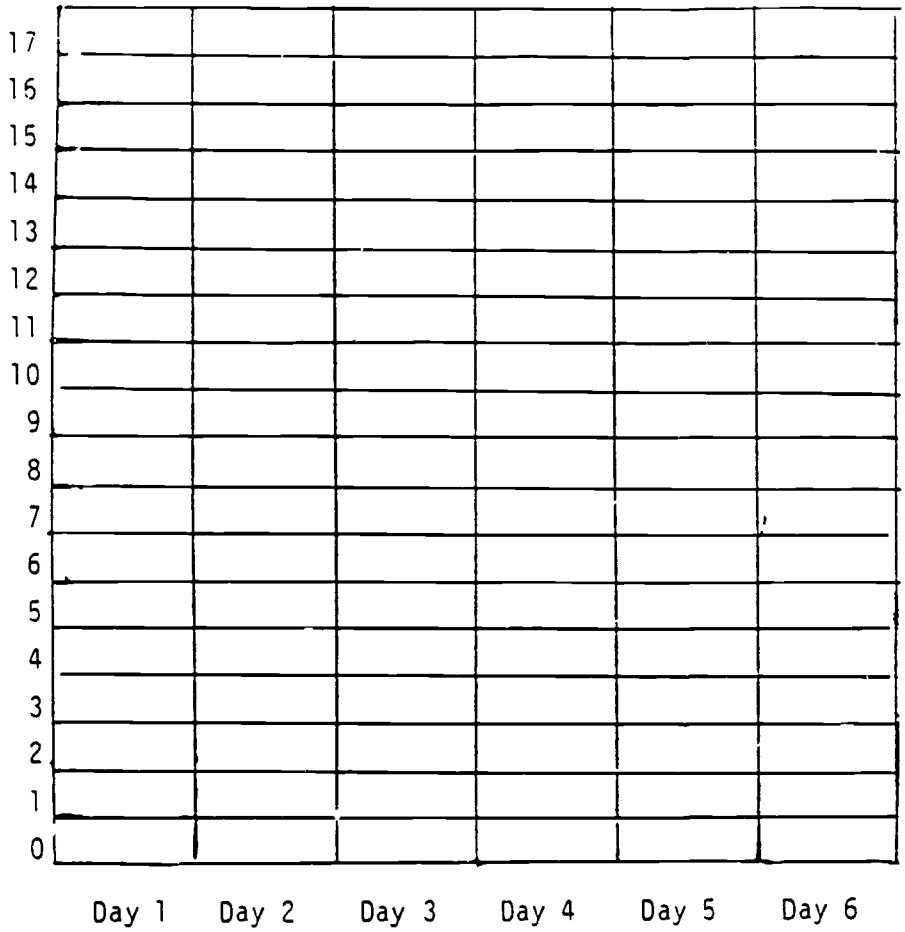
-----autogiro B

-----autogiro C

2.3a.P.21

A third grade class planted their seeds in loam. After observing their seeds in loam and after observing the growth of their seeds for 5 days, this is the data they collected.

Day 1 - no growth visible
Day 2 - no growth visible
Day 3 - 2 units
Day 4 - 4 units
Day 5 - 6 units



3.4.P.21

Using the bar graph from 3.3a.P.21 predict the growth of the plant on Day 6.

A. 5 units

B. 8 units

C. 12 units

3.1.F.20

*Note to teacher: Prepare containers with samples of clay, loam, and sand. Label containers 1, 2, 3, and set up as a station. (You may want several sets of stations.)

Observe the soil samples of the station. Answer the following questions. Choose the answer you choose.

Soil sample 1 is:

A. clay soil
B. loam
C. sandy soil

Soil sample 2 is:

A. clay soil
B. loam
C. sandy soil

Soil sample 3 is:

A. clay soil
B. loam
C. sandy soil

3.2.C.30

John added water to his cup of soil. Very little water passed through the soil. Soil was probably _____.

A. clay soil

B. loam

C. sandy soil

3.3.C.31

Sara has 3 radish seeds. Choose the soil type in which Sara should plant her seeds to have them grow best.

A. clay soil

B. loam

C. sandy soil

3.8.C.23

Jimmy planted the root of a pinto bean seed. When Jimmy observed the container a week later he found:

A. another pinto bean seed

B. no growth at all

C. a tall, healthy plant

3.4.P.21

1. Salt water is a solution of salt and water. How could the salt be separated from the water?

A. pour off the water

B. stir the solution

C. boil the solution

D. put in more salt

2. Which of the following mixtures can be separated by sifting?

A. beads and buttons

B. sand and flour

C. flour and iron filings

D. sand and gravel

APPENDIX N:
PTA EVALUATIONS

☐ Parent
☐ Student
☐ Teacher

ELEMENTARY SCIENCE PRESENTATION FEEDBACK

1. How helpful has this presentation been in helping give a better understanding of the new elementary science program?

very low 1 2 3 4^{3} 5^{33} very high

2. How clearly was the information presented in an understandable manner?

very low 1 2 3^{1} 4^{2} 5^{33} very high

3. How would you rate this presentation in terms of interest appeal?

very low 1 2 3 4^{5} 5^{31} very high

4. How would you now rate the level of <u>your</u> understanding of our elementary science program NOW as compared to when you came?

very low 1 2 3^{1} 4^{5} 5^{30} very high

SUGGESTIONS:

GED:ms

SUGGESTIONS:

Are there some recommendations for kindergarten in science, specifics to present to the children to prepare them for the program in the next grades?

I thought this program was very interesting and really think this is a better way of teaching our children.

Photos could be improved - perhaps Nick could be sent to photography school if the funds are available.

It was a very interesting P.T.A. session although it can't really compete with a Bill Cosby show.

The models of plant and animal are great. The middle school children don't seem to be as excited about science as elementary can something be done?

Great!!

This was very interesting!

Sounds like a much more interesting program than was used previously. I'm glad my child is getting in on it.

Thank you for letting us do the pendulum experiment. I think we all understand "Hands On" very well now.

You keep my attention!

Great job! Carry on! (within reason!!)

I feel the program was very interesting. Mr. Dunkleberger did a fine job of presenting it.

I think this is a very good program and I know from experience my children find it very interesting. This was a very good presentation.

I enjoyed the overview of the Grades 1-5 program. I was not aware of the total program before.

It was very helpful to learn more about what is taught in other grades besides the one I teach, and to see how our curriculum fits in to the whole program.

Dr. Dunkleberger personality goes a long way in making listening and learning easy and understandable. More parents should benefit from a great opportunity. I'm a dedicated advocate of hands on from way back! More curriculum should follow suit.

Excellent presentation.

I thought the program was very interesting and I'm glad the kids are able to do things, than when we went to school and had to just sit and listen and memorize things.

SUGGESTIONS:

The presentation was very good although explanation of each unit per grade level could have been a little more detailed. Question from 4th mom on Chemistry was valid-kitchen or cupboard should be stressed. Thought you did a SUPER job --giving a hands on experience to group was motivating.

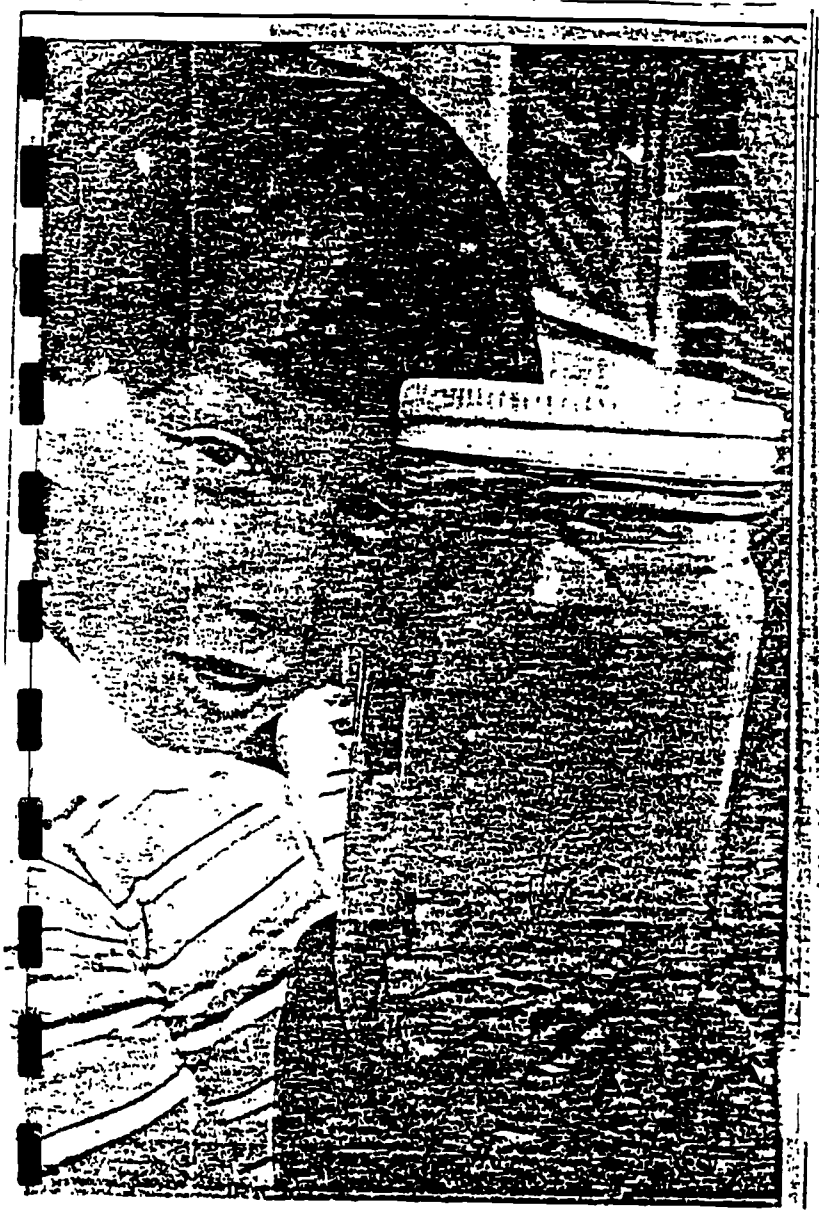
Good to have explanation of science in other grades. Grading - each first grade lesson has an evaluation sheet.

Very informative!

APPENDIX O:
NEWSPAPER CLIPPINGS

Carroll County Time

Number 214 Westminster, Maryland. Friday, September 21, 1984 30 c



Bugs

Pupils love hands-on classes

By DEBBIE McDANIEL
Staff Writer

What began as a just another pleasant fall outing on the front lawn of William Winchester Elementary School turned into a night-mare Thursday for the grasshopper, cricket and spider populations.

Butterflies had it easy — they could outdistance the spinning, whooping, net-waving second graders with ease.

But other insects had it rough. The students were enthusiastically enjoying an activity taken from the system's new elementary school science curriculum: trapping the critters with nets, putting them in jars and toting them to the classroom for scrutiny.

The hands-on curriculum in place in seven of the county's 15 elementary schools this fall is dominated by laboratory work, resulting in students learning how to observe, classify, predict and experiment — just as scientists do. Instead of reading about insects and memorizing the facts and terms, students catch and observe the bugs.

Instead of reading about pond life, fourth graders the students learn to take samples of pond water, put it on a slide, view it under a microscope and identify organisms.

"The kids love it," said second grade instructor Betty Bohr, observing her net-wielding students and urging them to think the best way to get insects from a net into a jar.

The kids who usually have difficulty participating in classes, they don't feel threatened," she said.

No one held back when hunting the critters, which spent the night in collection boxes and today will benefit science when pupils identify visually the insects' body parts before setting them free.

Similar hands-on lessons are taking place this year at other schools where the new curriculum is in place, said Gary E. Dunkleberger, county science supervisor. Winfield, Eldersburg, Freedom, Sandymount, Mechanicsville and Westminster elementary schools got the curriculum this fall while the rest will receive it next year, he said.

It's not a type-of program where kids read about science; they do science, he said.

Younger students are easily motivated by the hands-on approach and learn best with concrete experiences.

The life science, physical science and earth science units taught in each grade in these schools will involve laboratory work beginning in 1985, Tyree said the old program was "too technical" and "too broad" for students.

An added benefit, they say, of the language concepts young students obtain — first graders who hold and talk about their see patterns or arrange, for example, have a associating, it's an old word, Tyree said.

The other elementary schools not currently using the program will get their chance next fall. The decision to phase in the curriculum was based on reasons such as cost and the numbers of teachers who would have needed training and aid when they first year working with the new materials, officials said.

In Carroll County

THE EVE... Su

OL 145 NO 6 FRIDAY, SEPTEMBER 21, 1984

...RE'S THE BUG! — Second ...ders at William Winchester Elemen... School in Westminster went outside Thursday in search of insects for classroom observation later. Collecting insects is just one part of the new approach to science in elementary schools. (Evening Sun Photo by Tom Zarfos)

Science classes initiate new type of learning

By TOM ZARFOS
Sun Reporter

...STMINSTER — Some Carroll ...ty elementary school science ... s aren't as quiet as they used to ... ut teachers and administrators ... mind instead of showing a lack of ... dline the noise marks a new type ... rning

... officials are implementing in ... of the 16 schools a new approach to science that involves more laboratory and hands-on work Instead of reading about things such as insects, the students are moving outside, the building to find them.

"It's those kinds of experiences that stick with you," says Brian Lockard, director of elementary and middle schools in Carroll County "The students are acting as scientists "

The new approach was developed by teachers who will be trained The review of science programs in elementary schools began in late 1983 and will be complete when the remaining nine schools implement it next year

School officials are phasing in the program to spread the cost of the program over several years They say the program can be managed better and teachers can get the proper support if the new approach is begun in stages

The focus of the new approach is to get the students directly involved, to have them experience science. School officials found that not only the students were excited and motivated by the new program in pilot phases, but teachers were also affected.

After being trained in the new program, teachers were anxious to begin They are as excited and motivated as the students

The purpose of the new approach is to foster reasoning skills and appropriate language and arouse the interest of students Students are to use all of the science processes, observing, classifying, measuring, interpreting, inferring, predicting, investigating and modeling

For example, students at William Winchester Elementary School Tuesday were doing a variety of lab activities First graders were examining fruits with magnifying glass Second graders were collecting insects Other students were preparing slides of small water creatures to be viewed under a microscope

All the experiments involved some sort of reading assignment specially designed to match the activity According to Gary Dunkleberger, supervisor of science in county schools, each grade will use about five to six books during the year, instead of just one textbook.

Eventually each unit studied will have a variety of books to accompany the lesson, he says.

Larry Tyree, principal at William Winchester, notes that the new approach better helps the students learn about other disciplines, such as language, thinking processes, etc.

"It's important to do the pencil and paper tasks, but this (experimentation) teaches them to observe," Tyree says "I've seen a lot of excitment in our staff because of this approach "

The new program has been organized into a curriculum guide that every science teacher uses as their own textbook. The guides allow flexibility in designing lessons and will be reviewed after about two years.

2 - MD. - The Evening Sun Wednesday, June 12, 1985

Kids volunteer for summer 'fun'

By ELISE ARMACOST
Sun Reporter

WESTMINSTER – Homework is the last thing you'd expect most kids to want to do during summer vacation, but about 1,500 local elementary school children have volunteered to do just, that.

When they get off the bus today for the last time until September, these children will be carrying brightly-colored activity books called "Summer Science Fun."

Written by a team of 15 Carroll teachers, the books are a collection of assignments designed both to reinforce, and enlarge upon what children have already learned during the regular school year, Dr. Gary E. Dunkleberger, supervisor of science, explained Tuesday.

In second grade, for example, children study a unit on insects. So, the second grade summer package includes activities that allow them to observe bugs firsthand.

With the "ant watching" activity children construct their own ant farm. Another project tells them how to place a caterpillar in a jar so they can watch it turn into a butterfly.

Depending on the grade level, most of the "hands-on" assignments ask the child to explain in writing or draw pictures illustrating what they have observed. "We do a lot of drawing," Dunkleberger said. "First graders are not going to be able to record data in words."

The summer packages also include word searches, crossword puzzles and other exercises designed to help reinforce what students have already learned.

The fledgling summer program has been introduced in the seven elementaries that converted this year to a new science curriculum geared to experiments and other hands-on work, Dunkleberger said. Pilot schools include Eldersburg, Freedom, Mechanicsville, Sandymount, Winfield, William Winchester and Westminster elementaries.

About 1,500, or 40 percent, of the children in those schools will be participating in "Summer Science Fun," Dunkleberger said. In the lower grades, the acceptance rate was even higher – about 60 to 70 percent.

"It's kind of neat to see that many kids wanting to have homework over the summer ... The 40 percent response we've had says something very positive (about the childrens' attitudes.)"

Next year, as the rest of the county's elementaries implement the hands-on science program, all pupils in grades one through five will have the opportunity to use the summer science package.

Dunkleberger and other teachers will refine the program according to comments from parents of children who use it this summer.

Children are not required to complete any special number of assignments, Dunkleberger said. When they return their "Summer Science Fun" books to their new science teachers this September, they will receive certificates, even if they have finished just one project.

"I think most youngsters will do a reasonable number, but if he does even one that is one more than is required of him."

School Superintendent Olin L. Adams Jr. said he favors the idea of keeping learning alive during the summer. "Summer is a fun time, vacation time, time for different kinds of experiences, but learning goes on even though the atmosphere changes."

Parents who did not receive letters explaining the program but would like their children to have copies of the summer science package should contact their local school or the school system's central office.

AGES
ide, A5
MINISTRY
Sundays in jail, C1
TENNIS
CCTA doubles, B1

Carroll County Times

ber 153 Westminster Maryland Wednesday, June 26, 1985 30 cent

Time is right for Science Fun

By DENNIS McCAFFERTY
Staff Writer

The Martha and the Vandellas song goes: "Summer's here and the time is right for..."

Science?

Gary E. Dunkleberger, Carroll Board of Education supervisor of science, is attempting to make the time right by starting the Summer Science Fun project for students who attend seven Carroll elementary schools.

The students, from William Winchester, Westminster, Freedom, Eldersburg, Winfield, Sandymount and Mechanicsville elementary schools underwent the first year of a revised science program in the 1984-85 academic year. The program involved more "discovery work" than the previous program, Dunkleberger said.

The Summer Science Fun project is intended as a follow-up to the new science program, Dunkleberger said. Teachers were familiarized with the project in mid-May at a one-day workshop and immediately began promoting the idea to students.

The response was good, Dunkleberger said. Some 1,500 students signed up, representing 40 percent of the eligible students.

"That's a reflection of the program," said Richard L. Hanson, Carroll elementary supervisor. "We've turned the students on to science. The teachers have sold the students on the idea."

Participating students were given a science project booklet corresponding to their grade level that they can work on at home during the summer. Parents are asked to mark the activities completed and evaluate the project.

Students who complete the summer program don't receive a grade, but can earn a certificate of completion, Dunkleberger said.

The project has two types of lessons: those that reinforce the lessons learned during the year and those that extend the learning to related information.

A reinforcement lesson may be a word search or a crossword puzzle.

The extension lessons are more experimental. One lesson, from the fourth grade project book, is entitled "How observant are you?" The student is asked to play detective, trying to observe a one-yard random sample of outdoor space.

The lesson requires the student to become aware of his or her senses and how they are used.

The new science program will go into effect for the nine remaining Carroll elementary schools next year. Those students will be able to participate in the summer science project in 1986.

$122,713 grant used to improve science curriculum

By Steve Kelly
The Carroll Sun

The methods by which science is taught in county elementary schools will change next year, thanks in part to a $122,713 grant from the National Science Foundation (NSF).

"We're excited about it," said Gary E. Dunkleberger, county supervisor of science. "The really neat thing about [the grant] is that NSF normally doesn't make grants to public school systems. They usually go to colleges or [private organizations]."

The money, applied for in October, 1984, and granted last month, will be used to train teachers this summer in a new curriculum and for an honors program, where outstanding county educators will receive additional training in science.

Carroll is changing its elementary school science curriculum as part of a revision program begun in 1981, said Mr. Dunkleberger.

"Our previous curriculum had been in place for 12 years," necessitating an update, he said.

The new curriculum will involve more learning in laboratory settings, relying less on traditional methods requiring textbooks and teacher lectures.

New teaching methods will "involve a lot more hands on learning" on the part of students, said Mr. Dunkleberger. No textbooks will be used, although teachers will provide reading materials they find interesting or useful.

"It [training] will give teachers a more in-depth science background," said Mr. Dunkleberger. "Elementary school teachers have to cover such a broad range [of subjects] that typically their science content is on the short end of that."

The money also will be used to pay graduate students from the University of Maryland to enter county schools during the year and act as "coaches" for newly trained teachers.

The graduate students normally will visit teachers once a week, to assist in implementing teaching methods, critique lessons and answer teachers' questions, said Mr. Dunkleberger.

An initial teacher training and coaching phase began last summer and during the 1984-1985 school year, with $17,000 from the State Department of Education, said Mr. Dunkleberger.

"Approximately half the elementary schools saw implementation [of the new curriculum] in 1984-1985 and the rest will next year," he said.

He added the county now will have enough money to hire three graduate student coaches in the coming school year, as opposed to the one — Anne Benbow, a doctoral student in science education — hired last year.

In addition, money from NSF will be used to conduct a workshop this summer "for really exceptional teachers," said Mr. Dunkleberger. "It's part of NSF's program to recognize excellent teachers."

The 17 teachers, selected from a pool of applicants by a committee — including Mr. Dunkleberger and Ms. Benbow — will attend a two-week, graduate-level seminar at East Middle School, beginning July 22. The seminar will be taught by personnel from Hood College in Frederick.

The seminar will give teachers a chance to explore specific areas of science education — such as the study of insects or electricity — more closely than the initial training program allowed, said Mr. Dunkleberger.

Teachers and their Hood instructors also will review and polish curriculum during the workshop.

Larry L. Hatfield, a program director with NSF, said the agency typically does not award money to school systems.

"But it's not unusual," he said. "We do make awards to school systems. This [award] is not a precedent."

The award to the county came from approximately $18 million in NSF money budgeted for teacher workshops.

Carroll was chosen to receive a grant because its proposed program, if successful, could be used as a model for other school systems contemplating similar projects, said Mr. Hatfield, adding the program showed potential for success. The proposal "showed a high degree of collaboration between the school system and [the participating colleges]."

Susan P. Snyder, science specialist for the State Department of Education, said no other Maryland school system has received NSF money this year.

The program's training and coaching of teachers is based on similar programs studied and tested in California schools, she said.

"It's a very special program [Carroll] is putting together."

Jayson Knott photo

Diane Hughes and Dan Clifford, both teachers at William Winchester Elementary, sweep the grass for insects Tuesday afternoon at the Teachers' Workshop at East Middle School.

Honors science instructors attend workshop

Teachers take to the fields

By DENNIS McCAFFERTY
Staff Writer

The 18 grown men and women were scattered along the west end of the Westminster East Middle School yard, using panty-hose nets to catch insects in bushes and weeds and on trees.

But there was no need for the little white-clothed men with butterfly nets to come and take them to padded cells. After all, these were Carroll elementary school science teachers.

The teachers, recognized as excellent instructors, were participating in a two-week honors workshop, "Special Topics in Elementary Science," which ends Friday. The workshop which qualifies as the three-credit "Science Topics for Elementary School Teachers" graduate course at Hood College, and will help the teachers in the second year of the revised science program.

The teachers are from William Winchester, Westminster, Freedom, Eldersburg, Sandymount and Mechanicsville elementary schools. All six schools last year underwent the inaugural year of the program, which emphasises "discovery work."

Winfield Elementary also participated in the program last year, but did not have a teacher at the workshop. The remaining Carroll elementary schools will undergo the program this year.

The workshop is taught by Dean Wood, professor of sciences at Hood, and Paul J. Hummer, a part-time science professor at Hood and a part-time teacher at Middletown High School. It is designed to get the teachers better-acquainted with the discovery work they will be teaching this year.

"If you're going to teach it and say you can do it," said Gary E. Dunkleberger, supervisor of science, "you got to go out and see if it can be done.

The teachers have spent six hours from Monday through Friday since July 22 observing a caterpillar change into a butterfly, catching insects with the "sweep nets" and studying organisms in a bucket of mud.

"The workshop is designed to give the teachers a more advanced level of the program's background," Dunkleberger said. "It's not a remedial thing. We're not teaching them to teach the program."

Delores A. Davis, a second-grade science teacher who was the first teacher to catch a bug with a sweep net on Tuesday, said she was enthusiastic about the workshop.

"It helps the teachers with things they are not sure of in the program," she said. "I've learned how to do a lot of pre-lab work and follow-up work and to take time with the children."

The workshop was made possible from a June 1985, non-matching, $122,713 National Science Foundation grant. The two-year grant pays for the cost of training the teachers for the new program and uses three University of Maryland—College Park graduate students as "coaches."

Hanover Evening Sun
10/12/85

Science program earns state award

WESTMINSTER — The hands-on elementary science program implemented in Carroll schools last year has been awarded by the Maryland Association of Science Teachers and the Search for Excellence in Science Education Committee.

The Carroll program is one of four throughout the state that the committee selected as exemplary, and it is the only system-wide program to be so honored.

According to a release from committee chairman Dean A. Wood, local science educators have devised a "planned, sequential program for all students that emphasizes hands-on, involved learning, periodic program review and evalution, activities applicable to students' lives, integration of science with other areas, motivated teachers and full school system support."

Dr. Gary E. Dunkleberger, supervisor of science in Carroll schools, said children responded enthusiastically to the hands-on, laboratory-oriented approach as soon as it was piloted in 1983.

"What we found was that kids were more excited about this program than the other. They wanted to come home and repeat it with their parents."

The new program was started in half of the county's elementary schools during the 1984-85 school year; the remaining schools began using it this year.

A search committee of teachers, school administrators and professors chose the program for the award. Judging was based on criteria established by a task force of the National Science Teachers Association.

All four honored curriculums will now be submitted to the NSTA for consideration in the National Search for Excellence in Science Education.

Dunkleberger credited local teachers with the program's success. "It doesn't really matter what you have on paper. The bottom line is what goes on in the classrooms."

Most of the program was funded by three state grants totaling $27,000 and National Science Foundation grant worth $122,713. About $90,000 for materials and science kits and $25,000 for books came out of local coffers.

Carroll science education representatives will accept the award Oct. 18 at the MAST's annual meeting in Ocean City.

APPENDIX P:
PILOT EVALUATIONS

BACKGROUND

> It is in fact nothing short of a miracle that the modern methods of instruction have not yet strangled the holy curiosity of inquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom; without this it goes to wrack and ruin without fail.
>
> --Albert Einstein

F. James Rutherford, chief of Education programs for the American Association for the Advancement of Science, recently noted: "At the elementary school level, instruction in science has almost ceased, being no more in most classrooms than a few minutes each week of reading from textbooks" (Mechling & Oliver, 1983). The primary goal of elementary science programs should be to help children learn how to learn so they will develop into critical thinkers and decision-makers (Fulton, Gates, & Krockover, 1980). Science is more than simple facts. It must involve the processes of science. Students must be given experiences that help to make them scientifically literate -- make them aware of how a scientist works and of how the knowledge of science is generated. An activity-oriented science program allows students to conduct laboratory experiments that aid in the development of effective reasoning and makes young students familiar with the very methods and concepts used by real scientists in their daily work (Orlich, 1980).

Current studies indicate, however, that the most commonly used teaching activity in elementary science classes is a single textbook series. Instruction in the classroom tends to follow the text materials and uses some group and individual activity, but hands-on activity and development of the processes of science appears to be on the decline (Audeh, 1982). The state of the art in elementary school science might be summarized by one word -- textbook. The textbook determines the content, the order, examples, and the application of that content. Teachers tend to believe in the textbook. In many elementary schools the science curriculum is little more than "a set of knowledges and skills rooted in the various disciplines of science and packaged in textbooks" (Mechling & Oliver, 1983a).

PURPOSE

The purpose of this study was to investigate the response of elementary classroom teachers toward a non-textbook approach to science instruction. It was generally anticipated that most elementary teachers would find great difficulty teaching science without the support of a text and would deem that approach less satisfactory than a program which employed a book.

SUBJECTS

The subjects for this study were forty elementary teachers in grades one through five. Subjects represented about 1/8 of the total elementary classroom teacher population in sixteen

elementary schools. Subjects could be best characterized as being predominately female, having taught for approximately 10 years in both rural and suburban school communities. All had volunteered for participation in this study. Several had indicated that they had actually been motivated to do so by a dislike for teaching science.

TREATMENT

Three different science instructional techniques or programs served as the treatments in this study. Treatment A was a commercially produced and packaged elementary science program developed around major conceptual schemes and employing a student textbook and a supportive classroom laboratory kit. Treatment B was also a commercially produced and packaged program which had a more balanced approach of content and processes. It also centered strongly around the student textbook, but provided a supportive laboratory kit for student use.

Treatment C consisted of a locally developed laboratory-based program. Three units were provided at each grade level with a strong emphasis on scientific processes. No basal science text was used. Instead, teachers were provided with a teacher's guide which detailed the content and processes covered in each lesson. Appropriate trade books were used to supplement the program. These reading materials, however, were used to follow-up and support student inquiry and discovery rather than precede it.

PROCEDURES

The 40 teacher participants were randomly assigned to one of three treatment groups. Teachers in each group taught two of the three programs. Consequently, two of the teacher groups taught the non-text program plus one of the text based programs included in this study. The third group of teachers employed only the two text based programs. This allowed for a comparison between text and non-text instruction and facilitated a verification of the equality of the two text programs. To avoid any bias that might result from the order in which programs were taught, subjects in each comparison group were divided so that the same number taught each program both semesters

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INSERT DIAGRAM

At the end of both semesters teachers were surveyed and asked to rate the program they were using. This rating was based on a Likert-type questionnaire currently developed for use in this study. It consisted of twenty items to which the teachers responded on a five-point continuum from "Strongly Agree" to "Strongly Disagree". All items were intended to elicit responses that differentiated between the instructional programs. Typical of these items would be: "I really dread teaching science" or "Teaching science can be lots of fun."

A Program Evaluation was used as a second instrument for the collection of data related to teacher perceptions of the programs under consideration. It consisted of statements regarding the program with which they were working. A five-point Likert response scale from "Strongly Agree" to "Strongly Disagree" was used. Statements employed focused upon the research questions under study.

Student attitudes were assesed by the use of a questionnaire consisting of fifteen Likert-type questions to which students answered on a three-point response range of "Agree - Undecided - Disagree". This consisted of related items which assessed student attitudes toward the learning of science.

RESEARCH QUESTIONS

Five basic research questions explored possible differences between programs. Specificially, attempts were made to determine if the non-text approach was equivalent to a textbook-based approach studied in terms of:

1) the amount of hands-on activity.
2) the inclusion of scientific processes.
3) the extent of student motivation.
4) the ease of program implementation.
5) the degree of teacher satisfaction.

FINDINGS

ANOVA techniques were employed to determine treatment related differences in the response patterns of teachers to items contained in the Program Evaluation. Teachers reported more favorable perceptions regarding the non-textbook approach than either of the other two programs included in this study. Findings related to four of the five research questions favored the hands-on, laboratory based program employing a basal text. The findings for all five are as follows:

QUESTION #1: AMOUNT OF HANDS-ON ACTIVITY

Teachers reported that with the lab-base , non textbook approach the "extent to which activities emphasized a direct hands-on approach" was greater than with the other two programs considered ($F(2,77) = 53.19$, $p<.001$). Similarily, they indicated that unlike the text-based programs, this approach required that the lab activities" be done to maintain the integrity of the program" ($F(2,75) = 23.84$, $p<.001$).

QUESTION #2: INCLUSION OF SCIENTIFIC PROCESSES

Teachers reported the non-text approach provided for greater inclusion of the scientific processes ($F(2,76) = 18.44$, $p<.001$). Furthermore, they indicated that this approach allowed for greater "discovery and experimentation on the part of students instead of being cookbook in nature" ($F(2,74) = 22.31$, $p<.001$) In addition, teacher responses indicated that neither of text program was as successful as the non-text approach in

providing for inclusion of "activities structured so that students perform them to gain new information rather than confirm material already known" ($F(2,76) = 11.57$, $p<.001$).

QUESTION 3: STUDENT MOVTIVATION

Participating teachers perceived that the "degree to which students were motivated by the program was greater in the non-text book approach ($F(2,76) = 18.18$ $p<.001$). Similarly, it "caused students to go beyond the assigned activity and try ideas on their own" to a greater extent ($F(2,76) = 6.08$, $p <005$). However, no differences wer perceived in the extent to which the program "caused students to initiate questions that went beyond what had been presented" ($F(2,76) = 1.54$, $p = .22$.

In addition, a student attitude survey ($r = .92$) toward the learning of science was administered to all students at both the beginning and the end of each semesters. It consisted of 15 Likert-type questions to which students responded on three point ("Agree", "Undecided", "Disagree") scale. The instrument consisted of eight positively worded and seven negatively worded items arranged in random order. Student responses indicated that they were more motivated by the non-text approach and the more concept oriented approach (Treatment A) than the Treatment B which had more of a process and content balance ($F(2,2091) = 8.21$, $p<.001$).

QUESTION 4: EASE OF PROGRAM IMPLEMENTATION

Participating teachers indicated the non-text approach would be difficult to implement ($F(2,76) = 8.50$, $p<.001$). This, in part, resulted from the perceived fact that the non-text approach required more preparation time than either of the other two ($F(2,77) = 14.22$, $p<.001$). However, participating teachers indicated that no differences existed in the "amount to which lab materials were provided" ($F(2,75)= 1.03$, $p=. 36$) and the "extent to which those not provided were easily found" ($F(2,61) = 2.04$, $p=.14$).

QUESTION 5: TEACHER MOTIVATION

Teachers indicated that they were much more motivated by the non-text approach than either of the other two programs considered ($F(2,76)=6.22$, $p<.005$). They also indicated that the non-text approach caused them "to devote more time to teaching science" ($F(2,75) = 11.57$, $p<.001$). A 20-item Likert-type questionnaire ($r=.92$) was administered to teachers to assess their attitudes toward teaching science. Subjects completed this survey at the beginning and end of each semester of this two semester study. This coincided with the beginning and end of their work with each of the programs. ANCOVA techniques indicated no program-related differences in teacher attitudes toward teaching science ($F(3,70) = 1.47$, $p=.24$).

DISCUSSION

The hands-on approach to science instruction generally received a more favorable response from teachers than did either of the

textbook programs. The singular exception was in the area of ease of implementation. To some extent that could have been anticipated since each text-based program was accompanied by a commercially produced kit of materials. On the other hand, supplies for the non-text approach were obtained locally from grocery stores, hardware stores and similar sources. In the form presented the materials lacked both the level of sophistication and completeness found in the other two.

One interesting finding was that although teachers found the non-text approach more difficult to implement, they also indicated they were more motivated by it and devoted more time to teaching it than with either of the other programs. At motivation to teach this particular science program was apparently present. The present study revealed that student attitudes toward learning science were much lower with one of the texts than with the other two programs. Of the two more favorably perceived programs, the text-based one had been in used within the system for the previous thirteen years. To what extent a lower level of teacher anxiety in teaching a familiar program may have been communicated to students is unclear. However, teachers perceived students as being more motivated by the non-text book approach than either of the other two. Students more often entered the room wanting to know if they were to do science that day. Teacher-reported comments indicated this enthusiasm carried back to homes where students in the non-text approach appeared to talk more about what they had done in science and more often attempted to repeat those activities for their parents. Student enthusiasm presumably resulted from less "reading about science and more student involvement in doing" science. It would appear that this interest and excitement on the part of students played an important role in promoting favorable teacher perceptions of the program.

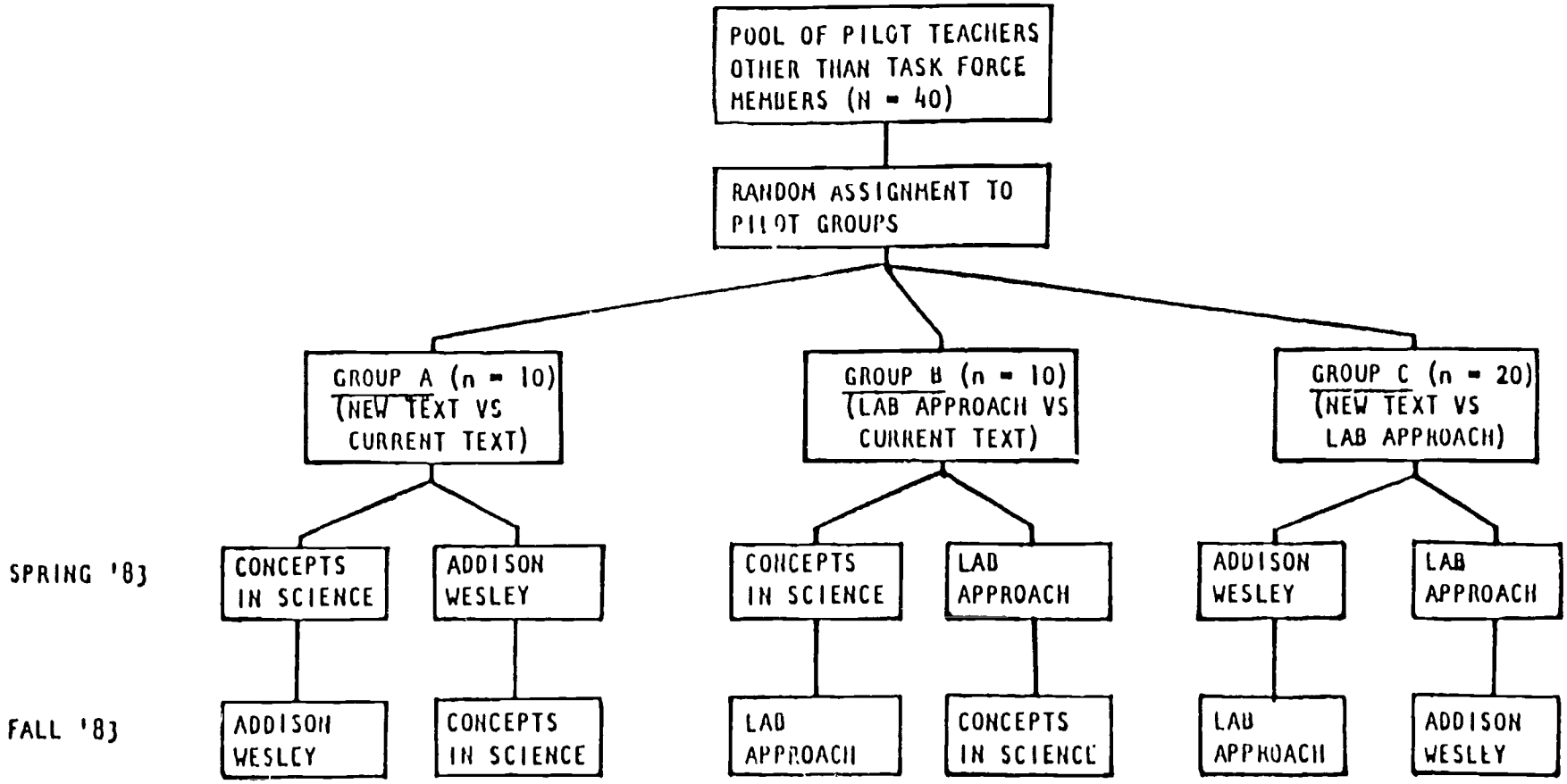
IMPLICATIONS

This study has several implications for both elementary teachers and for curriculum decision makers. The first is that a textbook is not essential for a science program to be accepted by teachers. In fact, utilization of a conventional text may detract from teaching the processes of science. This may be particulary true for teachers least favorably inclined toward teaching science in the first place. It is also apparent that such a program may be received with more teacher trepedation as the security of a book is lost. This insecurity may be compounded by the difficulty teachers experience when a science program is not accompanied by a kit of needed materials and supplies requiring them to obtain many items on their own. However, the one solution to that problem appears to be commercially produced, custom-made kits. The present authors find that to be a very valuable companion to locally developed

materials and a reasonable alternative to having teachers search for materials.

In making curriculum decisions about elementary sciences it would appear that if: 1) an increase in student and teacher motivation are desired and 2) the teaching of processes is important, a non-text approach similar to that used in the present study often viable alternative. Such a decision might be accompanied by a measure of teacher reluctance because of the great difficulty involved. However, those reservations may be modified as student enthusiasm is perceived by teachers.

ELEMENTARY SCIENCE PILOT



EVALUATION CRITERIA:

- Teacher program evaluations
- Student attitudes toward learning science
- Changes in teacher attitudes toward teaching science

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APPENDIX Q:
WORKSHOP EVALUATIONS

CARROLL COUNTY PUBLIC SCHOOLS
55 North Court Street
WESTMINSTER, MARYLAND 21157

TELEPHONE
(301) 848 8280
(301) 876 2108
(301) 875 3383

DR. ORIN C. STRAUB JR.
Superintendent

17 August, 1984

GRADE ONE - DAY ONE

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low 1 2 3[1] 4[4] 5[12] Very High

2. Usefulness of the Ideas Presented

Very Low 1 2 3[1] 4[3] 5[13] Very High

3. Quality of Materials Used or Demonstrated

Very Low 1 2 3[1] 4[7] 5[9] Very High

4. Merit of Activity Undertaken

Very Low 1 2 3[1] 4[5] 5[11] Very High

5. Interest Level of the Presentation

Very Low 1 2 3[1] 4[5] 5[11] Very High

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low 1 2 3[1] 4[2] 5[14] Very High

COMMENTS

GRADE 1 - DAY 1 EVALUATION OF INSERVICE

1. I feel very enthusiastic about the new curriculum. You have all done an outstanding job.
2. Very helpful ideas and explanations. Well prepared and presented!
3. Fast paced, informative, good suggestions, organized clear manual.
4. Super program. I think the kids will love it.
5. This has been the most practical inservice I've been to. Working through the experiments and having a chance to troubleshoot was great!
6. Workshop very well planned and organized. Presenters did a very good job. They seemed to enjoy their experience in the science unit.
7. Hands-on activities are great--kids and teachers enjoy them and learn a lot. I am looking forward to working with this program.
8. Work with peanuts was a bit too long. Background work, presentations and curriculum guide were excellent--well done!
9. Excellent workshop. Many helpful hints!--Thanks! Your hard work is appreciated.
10. Guide seems to be much easier to follow than previous guides in other areas. Helpful suggestions presented were good.
11. Session alittle too long. Good that things were not read to us that we could read.
12. The guide is easy to follow. The preparation section and materials will be most appreciated.
13. I really was not convinced that this would be useful workshop. I was wrong--it was great!!

CARROLL COUNTY PUBLIC SCHOOLS
55 North Court Street
WESTMINSTER, MARYLAND 21157

DR. [illegible] SHOWS JR.
Superintendent

TELEPHONE
(301) 848-6200
(301) 876-2208
(301) 875-3383

17 August, 1984

GRADE ONE - DAY TWO

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low 1 2^{1} 3^{2} 4^{6} 5^{9} Very High

2. Usefulness of the Ideas Presented

Very Low 1^{1} 2^{1} 3^{1} 4^{7} 5^{6} Very High

3. Quality of Materials Used or Demonstrated

Very Low 1 2^{1} 3^{1} 4^{8} 5^{9} Very High

4. Merit of Activity Undertaken

Very Low 1^{1} 2^{3} 3^{2} 4^{3} 5^{11} Very High

5. Interest Level of the Presentation

Very Low 1^{2} 2^{3} 3^{3} 4^{7} 5^{5} Very High

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low 1^{1} 2^{1} 3^{1} 4^{5} 5^{10} Very High

COMMENTS

GRADE 1 - DAY 2 EVALUATION COMMENTS

1. Dean Wood's presentation was especially valuable. Perhaps a mini workshop in science once a year would certainly keep motivation high in elementary school science.

2. This inservice was very good. I feel much more at ease about implementing the program. I feel working through the exercises was beneficial.

3. Presentation today was very informative. Good ideas for classroom use. Good lunch!

4. The additional ideas presented today were useful ones!

5. Management techniques were great. Very enjoyable 2 day workshop.

6. I can't wait to get started I have been pleasantly surprised with what you have come up with.

7. The demonstration lessons were very helpful especially the practical use of language arts activities. The Piaget session was a little long--would have preferred to have it center strictly on age group of first graders.

8. Presentations made me feel better about our new science program.

9. Having us do activities was helpful;may try to get us moving a bit more. Demonstrations and helpful management hints were also appreciated. Also was glad to hear again how all of this relates to Piaget.

10. Though Dean Wood has definite knowledge in the field of science, his presentation had little practical value for me personally. I am insulted when someone reads a hand-out to me. This is the 100th (slight exaggeration) time I've been subjected to a Piaget lecture--it tends to be redundant.

11. Morning, until Piaget hand-out was interesting and relevant. Very boring and heavy going through hand-out. Afternoon seemed more like a course than a workshop. Speaker was knowledgeable and competent but was too worried about things getting out of control. Needs to be "lighted".

12. Today's session reversed enthusiasm generated yesterday. While Dean is very knowledgeable, his presentation left much to be desired. Very little unknown material was presented. Piaget was run in... the ground. We also object to being read to. I can read. Thanks for yesterday.

13. Very overwhelming! Time scheduling is perplexing!

14. It would have been nice if these sessions could have been consolidated into one day.

15. The two days were a little drawn out. I think it could have been done in one day. Ideas and materials were interesting. Presenters were good, but too drawn out.

16. Information on Piaget not needed (repeated in every course or inservice). Probably could have presented the useful information in one a.m. session.

CARROLL COUNTY PUBLIC SCHOOLS
55 North Court Street
WESTMINSTER, MARYLAND 21157

TELEPHONE
(301) 848 8780
(301) 876 2208
(301) 875 3383

DR. DEAN E. WAYS JR.
Superintendent

17 August, 1984

GRADE TWO - DAY ONE

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1 Clarity of Presentation

Very Low 1 2 3 4^{6} 5^{14} Very High

2 Usefulness of the Ideas Presented

Very Low 1 2 3^{1} 4^{6} 5^{13} Very High

3. Quality of Materials Used or Demonstrated

Very Low 1 2 3^{1} 4^{1} 5^{16} Very High

4. Merit of Activity Undertaken

Very Low 1 2 3^{7} 4^{1} 5^{9} Very High

5. Interest Level of the Presentation

Very Low 1 2 3^{7} 4^{1} 5^{9} Very High

6 Probable extent to which you, personally, will use the ideas/materials

Very Low 1 2 3 4^{6} 5^{14} Very High

COMMENTS

GRADE 2 - DAY 1 EVALUATION COMMENTS

1. I arrived today with a very negative feeling about teaching science--I left more interested and full of fun-filled ideas for lessons. Nice job!
2. Excellent job. I had a good time and learned more.
3. It has been a lovely day spent in a very worthwhile manner! It will make me feel better as an instructor in science this coming year.
4. Helpful hints from teachers were valuable! Questions were answered.
5. I still feel a more concrete form of evaluation is needed.
6. Presented well. Would have been helpful to have had guide earlier to go over to ask and make observations on.
7. I think the material could possibly be covered in one day. Less time spent on going page by page through book--more time spent as questions and concerns.
8. Enjoyed constructing materials, seemed to be well organized.
9. I feel that the activities are for above average grade levels and not below grade level abilities.
10. It would be more helpful if we had the guides to read previous to the inservice.
11. It has been an interesting and fruitful day.
12. I feel better about the LAN approach, but it does seem that some of the "hands-on" is too much making of "fun stuff" which will not necessarily develop concepts.
13. The presentation cleared up a lot of questions about the program. I am still concerned, however, about availability of resource materials through the resource center if everyone teaches at the same time.
14. Better than expected, workshop leaders were very personable.
15. Type program isn't too cumbersome to plan with all the other subjects needed to be planned.
16. I feel the kids will show great interest. These topics relate to everyday living better than our present series (Concepts).

CARROLL COUNTY PUBLIC SCHOOLS
55 North Court Street
WESTMINSTER, MARYLAND 21157

DR. ROBERT M. MYERS, JR.
Superintendent

TELEPHONE
(301) 848-8200
(301) 876-2708
(301) 875-3383

1 August, 1984

GRADE TWO - DAY TWO

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low 1 2 3 4[1] 5[20] Very High

2. Usefulness of the Ideas Presented

Very Low 1 2 3 4 5[21] Very High

3. Quality of Materials Used or Demonstrated

Very Low 1 2 3 4[1] 5[20] Very High

4. Merit of Activity Undertaken

Very Low 1 2 3 4[4] 5[17] Very High

5. Interest Level of the Presentation

Very Low 1 2 3 4[4] 5[17] Very High

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low 1 2 3 4 5[21] Very High

COMMENTS

GRADE 2 - DAY 2 EVALUATION COMMENTS

1. Dean Wood was a very interesting, practical speaker. I enjoyed her presentation. (a very down-to-earth professor)
2. It was a very inspiring day--aside from being full!
3. Presentations were very good. High interest to me. The 2 days were well worth it.
4. Good presentation!! Enthusiasm makes the ideas more exciting and challenging to try.
5. Very useful activities. More time for helpful hints and suggestions. More time for questions.
6. Program seems to be interesting and not as bad as I thought. You seem to have covered all the bases.
7. I think I will feel very comfortable and motivated to use this program.
8. Excellent presentation. Somewhat "slow-moving" at times but great presentations. We gave us lots of constructive information.
9. Excellent!
10. Dean Wood was very effective in presenting ideas, giving suggestions and making the concepts to be presented much clearer.
11. We need an inservice like this for social studies. Please pass this message on!
12. Super!!
13. I liked Dean's down-to-kids level application of materials and ideas.
14. The speakers were very helpful with many ideas and techniques.
15. Very informative, well organized.
16. I feel much better than I did 2 days ago!
17. Explained ideas clearly and made me feel more comfortable with this system.
18. Excellent job done by Dean.
19. The activities today were well presented even though they were from manual--pages not gone through like yesterday.
20. Today was much more interesting. The presentation wasn't look step through the book!

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(301) 873 3383

DR OLIVER L. WILLIAMS JR
Superintendent

17 August, 1984

GRADE THREE - DAY ONE

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1 Clarity of Presentation

Very Low 1 2 3^{3} 4^{6} 5^{6} Very High

2 Usefulness of the Ideas Presented

Very Low 1 2 3^{1} 4^{5} 5^{9} Very High

3 Quality of Materials Used or Demonstrated

Very Low 1 2 3^{2} 4^{6} 5^{7} Very High

4 Merit of Activity Undertaken

Very Low 1 2 3^{5} 4^{2} 5^{8} Very High

5. Interest Level of the Presentation

Very Low 1 2 3^{4} 4^{6} 5^{5} Very High

6 Probable extent to which you, personally, will use the ideas/materials

Very Low 1 2 3^{1} 4^{5} 5^{7} Very High

COMMENTS

GRADE 3 - DAY 1 COMMENTS

1. I feel that more background information is needed for the teacher. (The experiments were great!)
2. An excellent presentation today. Obviously a tremendous amount of effort and dedication has been put into this program and will continue to be. I feel much more confident after today!
3. The workshop was very well done and informative. The variety of speakers and activities was very effective.
4. Very worthwhile!
5. Activities were very helpful--rather than having straight lecture.
6. The hands-on experience which we did were most helpful. The suggestions from the pilot teacher's classroom use were also most helpful.
7. Can't wait to see this in action!
8. Looking forward to using this curriculum. Only concern is that because of our departmental grouping, how will I fill in the additional time since I teach Science all year.
9. Criticisms don't seem to received well.
10. The instructors were well organized and did a marvelous job in making the task ahead seem easier.

ec
9/19/84

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17 August, 1984

GRADE THREE - DAY TWO

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low 1 2 3[1] 4 5[14] Very High

2. Usefulness of the Ideas Presented

Very Low 1 2 3[1] 4 5[14] Very High

3. Quality of Materials Used or Demonstrated

Very Low 1 2 3[1] 4[6] 5[7] Very High

4 Merit of Activity Undertaken

Very Low 1 2 3[1] 4 5[9] Very High

5. Interest Level of the Presentation

Very Low 1 2 3[1] 4[1] 5[13] Very High

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low 1[1] 2 3[1] 4 5[13] Very High

COMMENTS:

GRADE 3 - DAY 2 COMMENTS

1. Dr Wood was excellent and made everything more meaningful and relevent

2. Today pulled the "reasoning" behind the activities together and gave us many practical ways to use the book as well as good general guidelines to use when putting the lessons together.

   Today's activities may have been a better 1st day presentation and the 1st day's activities would have been more meaningful to us.

3. I feel much better about the purposes of our program and my concerns about time have been answered If anything, I hope now to have enough time.

4. Today's presentation certainly clarified the questions raised personally yesterday It was unfortunate this overview was not given yesterday so that the objectives, goals, logic of program would have been more obvious to those of us not at all familiar with 3rd grade science.

5. Thoroughly enjoyed Mr Wood!

6. I wish we could have seen Dr. Woods on both days or at least on the 1st instead of the 2nd day. He is SUPER!

7. Dean Wood give a fabulous presentation. The activities were fun and motivating. The information that he presented about teaching labs will be extremely useful.

8. Dean made this program seem fun to present and help with many of the management concerns.

9. Entire 2-day program was very helpful and certainly better prepared me for a new teaching experience. Much, much better than 2 days ago!

10. Dean's presentations have made me feel more prepared and qualified.

11. This was an excellent day I enjoyed Denn Wood so much and learned much more than I expected I do feel excited about the program and am anxious to give it my best shot in a few weeks!

12. This has been very beneficial in giving me insight into how and why to implement this particular approach to science. The use of reso ce people should prove to be invaluable. I would like to see a group formed for reviewing evaluative techniques (tests, etc) and updated supplemental - practical follow-up idea lists sent to us.

13. Fun - useful - very practical day!

14. I felt that the program was really put into perspective today.

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9/19/84

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17 August, 83

GRADE FOUR - DAY ONE

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low 1 2 3[1] 4[3] 5[9] Very High

2. Usefulness of the Ideas Presented

Very Low 1 2 3 4[3] 5[10] Very High

3. Quality of Materials Used or Demonstrated

Very Low 1 2 3 4[4] 5[9] Very High

4. Merit of Activity Undertaken

Very Low 1 2 3[1] 4[2] 5[10] Very High

5. Interest Level of the Presentation

Very Low 1 2 3[1] 4[3] 5[9] Very High

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low 1 2[1] 3 4[2] 5[10] Very High

COMMENTS

GRADE 4 DAY 1 COMMENTS

1. All of the activities were very helpful in seeing how the program can be organized. I liked the inductive reasoning techniques.

Very well organized. Presentations were clear. Feel more comfortable with program.

3. I like the way you've given helpful hints about things that you discovered from the experiences you've had. The experiments we did actually came from the book we will use, so it is all practical information. I'm very excited about the program.

4. I feel a little more comfortable about using the lab approach. I am really looking forward to management techniques being presented tomorrow.

5. I think a general over-view of the units would have been useful before starting into the specific lessons. Otherwise it was a very good day!

6. I feel much better about the use of this program after attending today's workshop. I still worry somewhat about organizing the time appropriately, but this is something I will need to work on independently.

7. Doing the experiments helped clarify vocabulary, approach, and some of the pitfalls one will find when doing the experiments with the children.

8. After experiencing the demonstrations today, I see more merit in the Lab approach.

9. Being able to manipulate the materials provided was very helpful in understanding how the program is to work. I have no reservations about the program and am anxious to try it!

10. I appreciate the simplicity in which you approached the material--it made me feel comfortable about the change instead of frantic.

11. Presentation was fun and educational but the day seemed long; I think it could be condensed. After having a vague idea of what was happening in the new program I am excited to implement it. I appreciate all the time in preparation.

12. Activities were presented well and were varied. Perhaps on the longer timed assignment, partial work could be done instead of rushing through the experiment.

13 [illegible] through the entire peanut process was a bit much. I do not enjoy [illegible]g through each step as my fourth graders would, although the suggestions would be helpful.

My concerns for the program were exhibited quite a few times today with "It's not in the kit but it will be."

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DR. ORVIS L. [illegible] JR.
Superintendent

17 August, 198[illegible]

GRADE FOUR - DAY TWO

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low 1 2 3 4 5[15] Very High

2. Usefulness of the Ideas Presented

Very Low 1 2 3 4 5[15] Very High

3 Quality of Materials Used or Demonstrated

Very Low 1 2 3 4 5[15] Very High

4. Merit of Activity Undertaken

Very Low 1 2 3 4 5[15] Very High

5. Interest Level of the Presentation

Very Low 1 2 3 4 5[13] Very High

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low 1 2 3 4 5[14] Very High

COMMENTS

GRADE 4 - DAY 2 COMMENTS

1. Today's presentation was most useful as it gave the teacher a tool to use as a guide in presenting activities in electricity to fourth grades. It really will help them understand concepts and vocabulary with better clarity. A good day!

2. Outstanding. Developed techniques and u erstanding.

3. Dr. Wood really gave a lot of great management techniques. They will be useful in all areas of teaching.

4. Very enjoyable - learned a lot. Dean is super.

5. Dean Wood is one of the best presenters we have ever had in an inservice program Involvement was the key, along with his enthusiasm. "Experience is a lesson you never have to reteach."

6. I really am beginning to feel more comfortable about the program and I really do see that it will greatly excite the children. I am sure their retention will be all that much greater as well. I do, however, honestly feel my organizational skills will greatly need to improve this year! All for the better, I'm sure!

7 Excellent presentation. Great organization.

8. I enjoy the workshop and felt extremely comfortable working and participating in it. This has gotten me excited about teaching science.

9 Feel a lot more confident about electricity. Anxious to get started.

10 I really enjoyed using the hands-on activity that the children will use because now I will feel more comfortable doing the experiments.

11. I feel the presentation was extremely informative and great in its discovery approach.

12 Mr. Wood helped me to bring order to a subject which was always mind-boggling to me. This has been the most instructive and helpful workshop that I've attended in 10 years

, I really feel like I understand the electricity unit I'll be teaching. I appreciate the basic approach and the clarity of the material Dean presented

14. Good basic information Useful enthusiasm.

15 Very useful information - very necessary - but a very long day!

cc
9/19/84

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GRADE FIVE - DAY ONE

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1 Clarity of Presentation

Very Low 1 2 3[1] 4[3] 5[11] very High

2 Usefulness of the Ideas Presented

Very Low 1[1] 2 3 4[3] 5[11] Very High

3 Quality of Materials Used or Demonstrated

Very Low 1 2 3[1] 4[2] 5[12] Very High

4 Merit of Activity Undertaken

Very Low 1 2 3[1] 4[3] 5[11] Very High

5. Interest Level of the Presentation

Very Low 1 2 3[1] 4[3] 5[9] Very High

6 Probable extent to which you, personally, will use the ideas/materials.

Very Low 1[5] 2 3 4[7] 5[2] Very High

COMMENTS

GRADE 5 - DAY 1 COMMENTS

1. Looks like a great program if you are teaching science!!
2. An excellent presentation - not teaching science gives one a different perspective toward attending.
3. I will probably not be teaching science I think this will be very valuable to teachers who will be teaching this program. I have enjoyed the day.
4. Very useful presentation of lab approach.
5. An insight into science program which will be used; however do not feel that teachers not teaching science need two days.
6. I must say I have changed my attitude about teaching science.
7. Actual experimentation is helpful.
8. Time well spent. Got me excited about teaching science. Need to pay teachers more for the time spent.
9. Being very accommodating and providing an informal atmosphere is very helpful I like the actual lesson presentation
10. Dean Wood had many good management techniques to offer--Gary is a "gem" not too serious!
11. Some of the activities done are not in teacher's manual (I don't think) and may be confusing as teacher's look through manual.
12. I do not think that people who are not teaching science should be attending or forced to attend Information was good
13. Perhaps a blow-by-blow review of the new curriculum guide would have been helpful for newcomers to the program. I enjoyed participating in the "hands-on" approach, but read-and-discuss may be less time consuming.
14. I found when there was disagreements in observations, nothing was clarified Therefore, I was very confused whether or not what I was observing was correct or if I was interpreting it incorrectly.

mr
9/19/84

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IN OFFICE ACCESS IN
Superintendent

17 [illegible], 1985

GRADE FIVE - DAY TWO

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this in-service activity, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future in-services might be improved. Feel free to add comments to clarify your views or add additional information.

1 Clarity of Presentation

Very Low 1 2 3 4^{6} 5^{9} Very High

2 Usefulness of the Ideas Presented

Very Low 1 2 3 4^{2} 5^{12} Very High

3 Quality of Materials Used or Demonstrated

Very Low 1 2 3^{2} 4^{4} 5^{9} Very High

4. Merit of Activity Undertaken

Very Low 1 2 3 4^{2} 5^{12} Very High

5 Interest Level of the Presentation

Very Low 1 2 3 4^{6} 5^{8} Very High

6 Probable extent to which you, personally, will use the ideas/materials

Very Low 1^{1} 2^{1} 3 4^{3} 5^{9} Very High

COMMENTS

GRADE 5 DAY 2 COMMENTS

1 Very useful for those who will be teaching it. If science were my favorite subject, I would be very anxious to give the new program a try.

2 The peanut lesson was very good. I thought more for 5th grade level than the observation sheet yesterday. Most useful hearing pointers from other teachers who have pilotted this already.

3 Great program for those teaching it.

4 I am concerned about storage of collected items but can live with a degree of "mess." I believe the kids will "love" the hands on.

5. I foresee lots of frustration with rock presentation charts as presented to us.

6 Good workshop even though I won't be teaching science.

7. Some of the presentations of each activity needed to be done just a little slower, so we could follow along easier.

8. Information was well presented in a relaxed atmosphere but was not relevant for me since I won't be teaching Science.

9 I feel every effort was made to make us excited about teaching science. All questions were addressed and answered sufficiently.

10 I find this very helpful in trying to get ready for the school year.

11 Presentations very well done. Redundant for pilot teachers but perhaps their input was needed tho they'd been thru it before.

12 The activities presented will really be appreciated and enjoyed by the children. Having gone through the activities is helpful for future reference.

13. A little more depth and background material is needed on some of the labs. For example, you give examples of possible questions to ask students but don't give the answers. I know some are obvious, but others aren't.

sc
9/19/84

APPENDIX R:
FOLLOW-UP EVALUATIONS

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DR. OLIN L. ADAMS, JR.
Superintendent

FOLLOW-UP WORKSHOP EVALUATION- GRADE 1

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this inservice activity today, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future inservices might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low	1	2	3	4	5	Very High
			4	15	4	

2. Usefulness of the Ideas Presented

Very Low	1	2	3	4	5	Very High
		1	4	9	8	

3. Quality of Materials Used or Demonstrated

Very Low	1	2	3	4	5	Very High
		1	5	8	1	

4. Merit of Activity Undertaken

Very Low	1	2	3	4	5	Very High
	1	1	3	12	6	

5. Interest Level of the Presentation

Very Low	1	2	3	4	5	Very High
	2	2	5	8	2	

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low	1	2	3	4	5	Very High
	1		4	10	5	

COMMENTS:

GED:ms

COMMENTS--Grade 1 Evaluation--Science

The material presented today was much more useful to me When units are being planned some problem areas have already been noted and in most cases corrected

This workshop was much more worthwhile than the summer workshop activities

Children so far have said they"love" science-as they get to eat the materials afterward--just completed Patterns to Eat

Good Workshop! Children enjoy working in groups and enjoy the hands-on-activities I enjoy teaching the units

I have received very positive feedback from both parents and children The "hands-on" activities are most appealing! I enjoy teaching the hands-on method!

I feel that some consideration should have been given to the fact that at open space schools, all 4 teachers were pulled for this workshop 4 substitutes should not be expected to conduct class in a first grade suite This workshop could have been done in 1/2 day sessions and only 2 teachers at a time pulled from the suite Great Program Kids seem enthusiastic and participation is great.

I strenuously object to all the first grade teachers in our school coming to this meeting at the same time It is ridiculous to have four substitutes in an open space and expect them to have a normal, educational day for our children Also, with American Education Week starting on Monday, we have to go in early to clean up the disarray from our rooms from Friday

Today's session was very helpful especially the morning

I just feel I couldn't add much to the discussion since I've only taught through the fruit

I am still very overwhelmed at the scheduling of science with other curriculum areas

Sharing ideas and problems was very beneficial, but I feel it could be done in less time I also believe that having all teachers from 1 grade level absent at a time is unwise Science program Children are responding very favorably to the program. I personally favor it and enjoy presenting it, but find the preparation time a problem. The support and cooperation from Dr. Dunkleberger and his office have been greatly felt and appreciated.

This meeting should have been held during the afternoon so that the children would only miss part of a day of usual instruction

Parents and children are quite excited about our new Science Program Very good feedback. Children do not like to end lesson

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FOLLOW-UP WORKSHOP EVALUATION - GRADE 2

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this inservice activity today, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future inservices might be improved. Feel free to add comments to clarify your views or add additional information.

---

1. Clarity of Presentation

   Very Low 1 2 3 (2) 4 (7) 5 (6) Very High

2. Usefulness of the Ideas Presented

   Very Low 1 2 3 4 (7) 5 (7) Very High

3. Quality of Materials Used or Demonstrated

   Very Low 1 (1) 2 (4) 3 (5) 4 5 (3) Very High

4. Merit of Activity Undertaken

   Very Low 1 2 (1) 3 4 (7) 5 (7) Very High

5. Interest Level of the Presentation

   Very Low 1 2 3 4 (8) 5 (6) Very High

6. Probable extent to which you, personally, will use the ideas/materials.

   Very Low 1 2 (1) 3 4 (5) 5 (8) Very High

COMMENTS:

GED:ms

COMMENTS--Grade 2--Evaluation--Science

Very helpful for Insect Unit Wish we could do some"testing" after teaching each unit

Great unit on insects--children very enthusiastic, they really took did a take-off on this unit, chose to do extended activities at home (looked for even more insects at home)

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FOLLOW-UP WORKSHOP EVALUATION - GRADE 3

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this inservice activity today, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future inservices might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

Very Low	1	2	3	4	5	Very High
			2	3	8	

2. Usefulness of the Ideas Presented

Very Low	1	2	3	4	5	Very High
			1	3	10	

3. Quality of Materials Used or Demonstrated

Very Low	1	2	3	4	5	Very High
			5	5	4	

4. Merit of Activity Undertaken

Very Low	1	2	3	4	5	Very High
				3	11	

5. Interest Level of the Presentation

Very Low	1	2	3	4	5	Very High
				5	8	

6. Probable extent to which you, personally, will use the ideas/materials.

Very Low	1	2	3	4	5	Very High
				2	12	

COMMENTS:

GED:ms

COMMENTS--Grade 3--Evaluation--Science

This has helped me think in terms of better evaluation in a process science program Also, sharing extension activities and problems experienced thus far, has given me progmatic ways to better implement this science program

Developing the questions was great Ann is a valuable part of the program

Writing test questions was very valuable and will be most useful in teaching units

The more I get into the program, the better I like it Right now, time is a problem for getting things done

This inservice gave me a lot of good teacher input of both problems and positive aspects of the Science program in an actual classroom setting It also gave me good extension ideas for various lessons as well as ideas on testmaking and evaluating students I still feel leary in giving a letter grade to a student and would like more input and guidance in this area

These Science workshops have been very, very helpful Dean Wood has helped me keep my head above water! I hope we do this again before the year is out! Best ever, follow-up!

This was just super I feel that I'm more secure in what I'm doing and really appreciate the additional ideas Children are enthusiastically sharing with parents what is going on in science at home They also look forward to each class activity and love to work on the task at hand Parents have had little to say about this program to this date Apparently they are comfortable with the change. There have been some questions about the evaluation process on the part of the teacher I still think it was a very good choice and that it will improve as we teachers work through it year after year

A helpful session which made me feel that maybe I'm on the right track! My biggest concern has been evaluation This helped today but I have a way to go Yes, the kids do like it, parents seem to like it and I feel better about it

The test making was helpful. I like the program--still have trouble adjusting to being concept-oriented

Terrific! I feel better about what I'm doing because of today Dean Wood is such a valuable asset--I appreciate the chance to have him clarify, explain, and illustrate the many things about which I've been confused! Helped to listen to each other, as well! Parent comments have been very positive Children are learning and enjoying Science, some for the first time!

The time spent on creating the test questions was time well spent!

Ann is extremely helpful, especially about test questions

The brainstorming session making test items was very valuable

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FOLLOW-UP WORKSHOP EVALUATION - GRADE 4

EVALUATION OF INSERVICE

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1. Clarity of Presentation

   Very Low 1 2 3 4[6] 5[7] Very High

2. Usefulness of the Ideas Presented

   Very Low 1 2 3[1] 4[3] 5[9] Very High

3. Quality of Materials Used or Demonstrated

   Very Low 1 2 3[1] 4[3] 5[3] Very High

4. Merit of Activity Undertaken

   Very Low 1 2 3 4[4] 5[9] Very High

5. Interest Level of the Presentation

   Very Low 1 2[1] 3[1] 4[3] 5[8] Very High

6. Probable extent to which you, personally, will use the ideas/materials.

   Very Low 1 2 3 4[3] 5[10] Very High

COMMENTS:

GED:ms

COMMENTS--Grade 4--Evaluation-Science

The kids love the program so far, and except for "technical difficulties" I'm very excited about teaching this program

Dr Wood, as usual, was excellent Any background information is most helpful, since that is what I feel this program is lacking most Kids absolutely love the program! Parents only comment so far is how much the kids love it It is so exciting for the kids that many days it is exhausting to teach I feel there is a real lack of background information Many days I wonder how much information is being conveyed to the children I found it very frustrating to not be able to identify the things found in the pond water Time and effort in getting materials not in the kit are frustrating

My students are highly motivated with the program The activities we have covered so far have generated excitement and questioning attitudes I am feeling more comfortable but am interested in any guidance available (rely on Ray for help-glad he's at my school)

Perceptions Parent--have had concern, I have spoken highly and they seemed convinced! Kids--are excited, however, getting disappointed with the waiting of ants and guppies to arrive I hope the credibility of neat things to come doesn't decline Myself--I am excited and tired Unfortunately the way we set this up I am teaching 2 back-to-back labs lasting 1-1/2 hours and I am exhausted! However, perhaps I can remedy this soon I am disappointed the texts will disappear as I am teaching this constantly all year Because I've not taught this before, I fear running out at the end of the year In summary--I do feel it should be an excellent program

The kids love it for the most part The parents are very responsive so far as evidenced at our recent parent visitation---many enthusiastic comments I feel comfortable and enjoy teaching this However, it can be very exhausting at times. Also, I feel I absolutely must have several (6) microscopes available for at least 6 weeks Ann has been very helpful

Children enjoy, and participate actively Parents are supportive and share enthusiasm with children Parents are even coming in to see the animals I enjoy the program but our bunch of kids keep it a challenge

I haven't taught this this year, but after this inservice I feel better about the whole unit. I do feel that there needs to be improvement as far as getting supplies, etc., which is vital to the success of the unit

We needed more time to work on constructing questions The time spent in the morning sharing ideas and concerns was helpful

The kids are really excited All of the parents I've talked to are really impressed with their children's excitement and enthusiasm for Science I am enjoying teaching the material and seeing the way the kids are reacting If I tell them they can bring in ants or pond water, I get at least half of the class bringing them in

I think the program will grow with us I am having the most problems with scheduling and receiving materials I enjoy it, but I need to get myself more organized.

The children seem very excited about the program Many of the children try the investigations at home Local pet stores have been selling many more aquariums. Parents have been very supportive in sending in pond water Also, after going through the program the 2nd time, things are going much more smoothly Most importantly, the children are really enthusiastic and enjoy science

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FOLLOW-UP WORKSHOP EVALUATION - GRADE 5

EVALUATION OF INSERVICE

In an attempt to better assess your perceptions of this inservice activity today, I am asking that you complete the following brief survey. Your candid appraisal is essential if weaknesses are to be identified and strengths reinforced so that future inservices might be improved. Feel free to add comments to clarify your views or add additional information.

1. Clarity of Presentation

   Very Low 1 2 3 4 [5] 5 [*] Very High

2. Usefulness of the Ideas Presented

   Very Low 1 2 3 [1] 4 [3] 5 [6] Very High

3. Quality of Materials Used or Demonstrated

   Very Low 1 2 3 [2] 4 [3] 5 [5] Very High

4. Merit of Activity Undertaken

   Very Low 1 2 [1] 3 [1] 4 [4] 5 [4] Very High

5. Interest Level of the Presentation

   Very Low 1 2 3 [1] 4 [8] 5 [1] Very High

6. Probable extent to which you, personally, will use the ideas/materials.

   Very Low 1 2 3 4 [3] 5 [6] Very High

COMMENTS:

GEO:ms

COMMENTS--Grade 5 Evaluation-Science

8th grade teacher very helpful

It is going to be helpful if you can have a group work on possible test items and other concepts to go with each unit I find students are very excited

Students' interest is very high Today's help in evaluating (questions) was helpful.

Helpful to know that others are having the same problems Helpful to review different types of questions to be used on tests Students love the program Occasionally they do get carried away with the activity instead of concentrating on the concept.

Hooray! A usable evaluation tool will soon be available! My kids LOVE the program So do I, but it's still a LOT more work for me This is offset by the gratification I get from the kids' enthusiasm

The day was very beneficial because we addressed the concerns that we have in regards to teaching the science lab program

I have a better feeling about program now I feel like what I am and have been doing with the program is o k We need more time to write evaluation materials

Today has made me feel a lot more relaxed and secure in teaching this science program I would like another session to make more test questions

I would appreciate another (possibly inservice) meeting where more test questions could be developed I enjoyed this very much because--it was a very functional meeting

I think this could have been handled in a half-day The afternoon dragged